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IMPERIAL FOREST SCHOOL,

DEHRA DÚN.

CALENDAR.

January 1, 1893.

Allahabad:
NORTH-WESTERN PROVINCES AND OUDH GOVERNMENT PRESS.
1893.

135

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STAFF OF THE IMPERIAL FOREST SCHOOL, DEHRA DUN.

Board of Control.

The Inspector-General of Forests with the Government of India (*President*);

The Director of Public Instruction, N.-W. Provinces and Oudh;

The Director of the School;

Two or three Conservators of Forests (chosen yearly from different Provinces);

The Assistant Inspector-General of Forests (*Secretary*).

DIRECTOR.

J. S. GAMBLE, M.A., Oxford; Fellow of the Madras University; F.L.S.; Conservator of Forests, School Circle, N.-W. P. and Oudh.

DEPUTY DIRECTOR.

A. SMYTHIES, B.A., Cambridge; Deputy Conservator of Forests, N.-W. P. and Oudh.

INSTRUCTORS.

UPPER CLASS.

Natural Science, Botany, &c. — A. F. GRADON, Offg. Dy. Conservator of Forests, Burma.

Surveying, Forest Engineering, &c. — C. G. ROGERS, Deputy Conservator of Forests, Bengal, L. P.

LOWER CLASS.

Babu UPENDRANATH KANJILAL, Temporary Extra Assistant Conservator, Assam.

Additional Instructors, not on the Permanent Staff.

Forest Law ... N. HEARLE, Dy. Conservator of Forests, Dehra Dún Division.

Mathematics ...	A. P. GRENFELL, Assist. Conservator of Forests, Saháranpur Division.
Zoology ...	E. C. COTES, Assistant Superintendent, Indian Museum, Calcutta.
Systematic Botany	J. F. DUTHIE, B.A., Director of the Botanical Department, Northern India.

Accounts and Procedure	Babu KASHESHWAR MOOKERJEE, Head Clerk, School Circle.
Science and Botany (Lower Class)	" BIRBAL, Forest Ranger.
Mathematics (Lower Class)	" GOPAL SINGH.

Store-keeper and Museum-keeper	Babu BIRBAL, Forest Ranger.
Accountant and Head Clerk	Pandit KRIPA RAM.
Hospital Assistant	GANGA SAHAI.

SCHOOL SITE AND BUILDINGS.

The Imperial Forest School, which was founded in 1878, is situated in Dehra Dún, in the North-Western Provinces. The School grounds lie to the south of the old Parade Ground and comprise the lands upon which the School buildings are erected, a vegetable and fruit garden and the Forest School Park or Arboretum.

The Buildings consist of :—

1. The main building containing—
   - 6 Lecture Rooms,
   - Library,
   - Museum Room,
   - Herbarium,
   - Offices of the Staff and those of the School Circle.
2. The Laboratory.
3. Quarters for 32 Students, others being built.
4. Carpenters' workshop and minor buildings.
5. Hospital.

The School was instituted for the instruction of the members of the Provincial staff of the Forest Department in India. Students are of three classes :—Government Students, Students from Native States, and Private Students.

RULES TO REGULATE APPOINTMENTS AND PROMOTIONS IN THE PROVINCIAL FOREST SERVICE.

I.—The Forest Service.

The Forest Service of India is composed as follows :—

(*a*) The Imperial Service.

(*b*) The Provincial Service.

(*c*) The Subordinate Service.

(*a*) The Imperial Service.

The Imperial Forest Service is recruited solely by officers directly appointed by the Secretary of State for India.

(*b*) The Provincial Service.

The Provincial Forest Service consists of :—

(*a*) Foresters who have obtained the Dehra Dún Forest School Certificate, Lower Standard.

(*b*) Forest Rangers.

(*c*) Extra-Assistant Conservators.

(*d*) Extra-Deputy Conservators.

(*c*) The Subordinate Service.

The Subordinate Forest Service, consisting of Foresters, Forest Guards, and other subordinate officials, is recruited from men appointed by Conservators or by Divisional Forest Officers under the sanction of section 40 of the Forest Code, and who do not pass through the Dehra Dún Forest School.

II.—The Provincial Forest Service.

The Provincial Forest Service can in future only be entered through the Dehra Dún Forest School.

III.—Admission Rules.

The rules for admission to the Forest School are as follows :—

1. There are two courses—one in English (the upper class), and a second in Hindustani (the lower class).

The former prepares students for the certificate in forestry by the higher standard ; the latter for the certificate in forestry by the lower standard.

2. Application for admission to the School may be made in the first instance either to the Director, or to Conservators of Forests direct, or through Divisional Forest Officers. Candidates for admission must not be less than 18 nor more than 25 years of age: exceptions to this rule will require the previous sanction of the Government of India. Each candidate must furnish a certificate of sound health, and of good vision and hearing from the Civil Surgeon of the station nearest to his place of residence.

3. It is the duty of the Director or the Conservator who receives the application to satisfy himself that the candidate is of good moral character and active habits; also that he possesses fair powers of observation, sense of locality, and such other qualifications as are necessary for an officer of the Forest Department.

Admission to the English Course.

4. Candidates* who are accepted under Rules 2 and 3 for the English Course must, before admission to the School, pass an Entrance Examination in the following subjects, *viz.*:—

English—composition and conversation.

Arithmetic—all branches.

Algebra—up to and including quadratic equations.

Elements of Euclid.

Mensuration—lengths, areas, and volumes.

5. This examination will be held before an officer of the School or before such officers of the Educational Department as the Local Governments may appoint for that purpose. The examination will be held either at the Forest School, or at such other convenient educational centres as the Local Governments may direct.

6. Conservators of Forests, including the Forest Officers of Coorg and Ajmere, are required to report to Local Governments by the 1st of January in each year the number of approved applicants, and submit proposals regarding the place or places at which the examination should be held.

The officers appointed by the Local Government to conduct the examinations should despatch to the Director on the 15th January in each year an application for the number of sets of examination papers to be sent to them. The examination papers will be forwarded from the Director's office, under sealed covers, not later than the 15th of the following month.

* Except those of Burmese, Shan, or Karen extraction, who, as a temporary measure during the years 1891 and 1892, will be admitted into the School after passing such Entrance Examination as a Conservator of Forests in Burma may deem sufficient.

The examinations will be held simultaneously throughout India on three successive days about the 1st March, the precise dates being fixed by the Director at the time that the examination papers are sent out. Examinations held on dates other than those thus fixed by him will be treated as invalid. The candidates' written answers will, after countersignature (with date) by the officer presiding at the examination, be returned in a sealed cover to the Director of the School. The Director will subsequently inform Conservators of the result of the examination.

7. The Local Government may, under such rules as it may lay down, require that there be selected from the list of passed applicants such number as it may deem desirable to admit into the Provincial Forest Department at the end of the School course. Applicants so selected will have a preferential claim to be appointed to the Department.

8. Local Governments may grant to special candidates while pursuing their studies in the upper class at the School, who are not already in receipt of any Government pay, an allowance not exceeding Rs. 50 a month under the conditions prescribed in Rule 13. Students will, on passing out of the School by the higher standard, be eligible for appointment as Rangers under section 34 of the Forest Code, and can then be promoted to the class of Extra-Assistant Conservators under the special provisions of Rule 2(*b*) in VI *infra*.

9. Local Governments may depute to the Forest School, in order to attend the English Course, officers who have served in the Subordinate Service for a period of not less than one full working season, provided that they have passed the examination prescribed in Rules 4 and 5. The age of all such officers shall be less than 25 years: an exception to this rule will require the previous sanction of the Government of India.

10. Local Governments may also depute Rangers to the School in order to qualify themselves for further promotion (*a*) in the class of Rangers, or (*b*) to that of Extra-Assistant Conservators. Such officials may be above 25 years of age, and need pass no qualifying examination, but will require to hold a certificate from the Conservator of Forests, under whom they are serving, that they possess sufficient general education and ability to enable them to profit by the English Course of instruction at the School.

Admission to the Hindustani Course.

11. Candidates for the Hindustani Course may be admitted as prescribed in the case of the English Course in Rules 2 and 3; but, in lieu of passing the Entrance Examination laid down in Rule 4, they must furnish a certificate of having passed the Middle

Class Examination in the North-Western Provinces and Oudh, or an equivalent standard in another Province, as well as a certificate that they possess a competent knowledge of Urdu or Hindi.

12. Local Governments may depute to the Forest School, in order to attend the Hindustani Course, officers who have served in the Subordinate Service for a period of not less than one full working season, provided that they have qualified as prescribed in the preceding rule for the admission of students of that class. The age of all such officers shall be less than 25 years: an exception to this rule will require the previous sanction of the Government of India.

13. Persons who may enter the Subordinate Forest Service with a view to being deputed for instruction to the Forest School at Dehra, as well as those who may be granted a Government stipend under Rule 8, shall be bound down by a formally executed Agreement—the sureties for the fulfilment of which should be men of some position and means—to continue in the Government Forest Service for a period of not less than five years after passing out of the Forest School, and on such rates of pay as may be in accordance with the existing organization of the Department. A breach of this condition, otherwise than with the consent of the Government of India, will render the offender and his sureties liable for the refund to Government of the entire cost of his education at the Forest School. The Agreement and Security Bond shall be in the appended forms (Appendix I), and must be executed before the student is admitted to the School. The Agreement will be signed by the student and, if he is a minor, by his father or guardian also; the Bond by the student and two sureties.

14. The obtaining of either of the certificates at the School will not, otherwise than as provided under Rule 7, be held to constitute a claim to Government service, although, when vacancies in the service occur, due consideration may be given to the fact that certificates have been obtained.

15. Students must supply their own note-books and stationery. Books from the book depôt will be supplied to them on cash payment only. Breakages and damages of School property must be paid for at once. As security for the due fulfilment of this condition, each student, not already in the service of Government, is required on entering the School to deposit a sum of Rs. 50 with the Director, the balance of which (if any) will be returned to him when he leaves. Students must, during their stay at the School, defray their own expenses including the cost of travelling. Travelling allowances are granted to students already in the service of Government.

16 Candidates from Native States must apply, through the Darbár, either to the Director or to a Conservator of Forests. The conditions for their admission are similar to those laid down for other students. Native States sending students to the School shall, before the beginning of each term, deposit with the Director a sum equivalent to the estimated cost of the students' living at the School for the term as stated in Rule 5 under IV, *infra*, as well as the security deposit of Rs. 50 provided for in the preceding Rule. Remittances for students from Native States must be made by drafts payable to the students and forwarded to them through the Director.

17. Previous to receiving into the School any person who is not already in Government service, or in receipt of a stipend from Government or from a Native State, the Director shall satisfy himself that the candidate or his friends are able and willing to provide him with funds up to the amounts and at the times laid down in the estimate appended (Appendix II). A student who fails in this respect to satisfy the Director shall not be allowed to remain at the School.

IV.—General Rules.

1. Candidates admitted to the School must join at Dehra Dún on the 25th June next after the date of their passing the Entrance Examination.

2. The courses of training extend over 21 months, the time being spent as follows :—

1st year.

1st July—31st October	At Dehra.
1st November—22nd December	In camp.
23rd December—5th January	Vacation.
6th January—31st May	In camp.
June	Vacation.

2nd year.

1st July—31st October	At Dehra.
1st November—22nd December	In camp.
23rd December—5th January	Vacation.
6th January—14th March	In camp.
15th March—31st March	Final examinations.

3. At the close of the course of instruction, successful students will receive a Certificate in Forestry (Higher or Lower Standard) with or without honours.

4. Students who have completed their course leave the School at the end of March; but any student who has failed to obtain his certificate may, at the discretion of the Director and, in the case of

students already in the service of, or in receipt of a stipend from, Government, with the sanction of the Local Government, or, in the case of students from Native States, of the Darbár, be retained to complete another full year's course of instruction. But during the course of instruction no examination for the final certificates will be held. Students who have failed to obtain the certificate by the Higher Standard by ten per cent. or less of the necessary marks, may, at the discretion of the Director, be granted a Certificate in Forestry by the Lower Standard. Conservators of Forests—the students selected or deputed by whom are about to undergo their final examinations—are required to inform the Director, before the end of February in each year, as to the place to which each student on leaving the School is required to go, and as to the amount of the advance, if any, which may be given to enable him to reach it.

5. The average monthly cost of living at the School is calculated to be as follows, *viz.* :—

For students living in the Native style Rs. 22 to Rs. 28.
For students living in the European style ... Rs. 35.

The above figures include the cost of food, ordinary clothes, uniform, rent, books, and instruments. The expenses of travelling and camping during the entire course of 21 months are calculated to come to something like an additional Rs. 130 for the former class, and about Rs. 210 for the latter class. The ordinary travelling allowances admissible to students already in the service of Government will cover these expenses.

6. All such students must, unless otherwise permitted by special order of the Director, live in the School quarters, if rooms therein are available. The rent charged is Rs. 2 per mensem for *each* student. Private students may be given quarters, when available, on the same terms.

7. During the course of instruction the Director will furnish Conservators, or Darbárs of Native States, with monthly reports on the character, application, and progress of the students sent by them to the School.

8. Students are liable to the following punishments :—

(1) Reprimand by the Teacher in class.

(2) Reprimand by the Director or the Deputy Director at any time.

(3) Reprimand before a Meeting, convened by the Director, of not less than three School Officers, one of whom must be either the Director or the Deputy Director. The proceedings of the Meeting will be reported to the

Conservator or the Native State deputing the student; and, if the Meeting so decides, a note of them will be made on his final Certificate.

(4) The Director, acting with the consensus of the Meeting referred to under (3), has power to inflict, in addition, a fine to the extent of one-third of the salary or allowances of the student for a period not exceeding three months.

(5) The Director, acting with the consensus of a full Meeting of the School Officers presided over by himself, has power to dismiss any student for misconduct; and a student thus dismissed cannot be re-admitted to the School.

The Director may remand any student who, in his opinion, is not sufficiently promising.

V.—Appointments to the class of Forest Rangers.

Appointments to the class of Forest Rangers may be given*—

(1) To passed students of the Dehra Dún Forest School—

(*a*) who have obtained the School Certificate in Forestry (Higher Standard) with or without honours;

(*b*) who have obtained the School Certificate in Forestry (Lower Standard) *with honours*, and who have afterwards rendered not less than *two* years' satisfactory service as Foresters;

(*c*) who have obtained the School Certificate in Forestry (Lower Standard) *without honours*, and who have afterwards rendered not less than *five* years' satisfactory service as Foresters.

All such appointments to fill existing vacancies may be made under the orders of the Conservator of Forests.

Candidates who are not natives of the province in which the appointment is to be made, or of a province in which one of the principal languages is the same, must furnish a certificate of having passed an examination by the lower standard in one of the principal languages of the province; or, in Burma, of having passed by the Elementary Standard in Burmese.

(2) Where there are no officers of the 1st class qualified for appointment, but not otherwise:—

(*a*) to subordinates who have earned such promotion by long, faithful, and meritorious service;

* The Chief Commissioner of Burma is authorized, as a temporary measure, to appoint as Rangers in Burma, in the absence of duly qualified candidates, persons who do not fulfil any of these conditions.

(*b*) to Native Non-Commissioned Officers of Her Majesty's Army who have entered the Forest Department under the orders contained in Circular No. 25-F., dated 13th November 1880.

Such appointments, to fill existing vacancies, may only be made under the orders of the Local Government.

VI.—Appointments to the class of Extra-Assistant Conservators.

Appointments to the class of Extra-Assistant Conservators (on salaries varying from Rs. 200 to Rs. 350) may be given :—

(1) To Forest Rangers—

(*a*) who have obtained at the Dehra Dún Forest School the Certificate in Forestry (Higher Standard), *with honours*, and who have afterwards rendered not less than *two* years' satisfactory service as Rangers in executive charge; or

(*b*) who have obtained this certificate *without honours*, and have afterwards rendered not less than *five* years' satisfactory service as Rangers in executive charge; or (in exceptional cases only)

(*c*) who were members of the Forest Department on the 1st December 1881, and who, though they have not obtained the Certificate in Forestry (Higher Standard), have done specially good and faithful service, including a term of not less than *five* years as Forest Rangers, and who have received a good general education and possess a sufficient knowledge of English.

(2) Where there are no Rangers in the province qualified for promotion under the above rules, but not otherwise—

(*a*) to candidates who, prior to the 1st July 1891, had been nominated by a Local Government under the rules embodied in section 36 of the Forest Department Code (3rd edition);

(*b*) to Rangers who, otherwise qualified, have not served the prescribed time.

In granting such appointments, students who obtain certificates *with honours* should be preferred to those who obtain certificates *without honours*.

Candidates nominated prior to the 1st July 1891 will continue to draw the allowances granted to them under section 39 of the Forest Department Code (3rd edition).

VII.—Appointments to the class of Extra-Deputy Conservators.

Appointments to the class of Extra-Deputy Conservators (on salaries varying from Rs. 450 to Rs. 600) will be made by the promotion of officers of the Lower Controlling Staff who hold the Higher Standard Certificate in Forestry of the Dehra Dún Forest School, and who have done good service of not less than five years as Extra-Assistant Conservators in either of the two upper grades (Rs. 350 and Rs. 300) of the latter class.

VIII.—Provincial Forest Service.

The Provincial Forest Service will be allotted to the same six Provincial Lists on which the Imperial Branch of the Upper Controlling Staff is borne, and the members of the Provincial Service will be shown on those lists according to seniority in service. Promotions will be made on each Provincial List as a whole, and not in respect of local Circles.

IX.—Promotions in the Provincial Forest Service.

Promotions in the Provincial Forest Service will be regulated as follows:—

Foresters to the class of Rangers if they have qualified under V (1).	By the Conservator.
Foresters to the class of Rangers if they are considered qualified under V (2). Rangers from grade to grade. Rangers to the class of Extra-Assistant Conservators. Extra-Assistant Conservators from grade to grade. Extra-Assistant Conservators to the class of Extra-Deputy Conservators. Extra-Deputy Conservators from grade to grade.	By the Local Government.

APPENDIX I.

Forms of Agreement and Bond to be executed by students already in the service of, or in receipt of stipends from, Government, previous to entry into the Forest School, Dehra Dún.

Articles of Agreement made and entered into this day of 18 BETWEEN of of the first part of son of the said of the second part and the SECRETARY OF STATE FOR INDIA IN COUNCIL hereinafter referred to as the Secretary of State of the third part. Whereby each of the parties hereto so far as the covenants and conditions on his own part are to be observed and performed covenants with the other of them as follows:—

1 The said hereby of his own free will and consent and with the approbation and consent of the said testified by the execution by him of these presents agrees with and to the Secretary of State his successors in office and assigns that he the said shall well and faithfully pursue his studies at the Government Forest School, Dehra Dún, and qualify for the Forest Service of the Government of British India or of any Local Government.

2. The said shall after completing his studies at the said Forest School and if so required to do serve the Secretary of State his successors in office and assigns in the Forest Department of the Government of British India or of any Local Government for a period of not less than five years and shall during the whole of such period diligently and efficiently do all acts and discharge all duties which may be required to be done by him in his capacity as an officer of the said Department.

3. The Secretary of State his successors in office and assigns hereby engages to educate the said at the Dehra Dún Forest School in all matters relating to forest service forest works and forest administration that it may be deemed necessary by the Director of the said School to teach the said

4. The Secretary of State shall pay the said during the whole period of his stay at the said

School at and after the rate of Rs. per month and thereafter while the said shall faithfully and diligently serve as an officer of the said Forest Department at and after the rate of not less than Rs. per month and the said shall be entitled to all the rights and privileges in respect of pay pension and promotion accorded to officers of the said Department for the time by the Rules and Regulations of the Department.

5. Lastly it is hereby agreed and declared that the Secretary of State his successors in office or assigns shall be at liberty to rescind this agreement on account of the negligence failure to attend to duty idleness or any insubordination or misconduct on the part of the said and to dismiss him from the said Forest School or the service of the said Department and the said shall not be entitled to any of the privileges hereby imposed on him but the said or shall thereupon refund to the Secretary of State his successors in office and assigns the total cost including the monthly payments made to the said while at the said School incurred by the Secretary of State or his successors in office or assigns in respect of the education of the said at the said School. IN WITNESS whereof the said parties to these presents have hereunto set their respective hands and seals the day and year first above written.

Know all men by these presents that we of principal (obligor) of and of (sureties) are jointly and severally bound to the SECRETARY OF STATE FOR INDIA IN COUNCIL in the sum of Rs. to be paid to the said Secretary of State his successors in office or assigns or his or their certain attorney or attorneys for which payment well and truly to be made we bind ourselves our heirs executors administrators and representatives and each of us binds himself his heirs executors administrators and representatives firmly by these presents sealed with our seals and dated this day of 18 .

WHEREAS the Secretary of State for India in Council for himself and his successors in office and assigns has engaged to educate the said at the Dehra Dún Forest School in all matters relating to forest science forest works and forest administration that it may be deemed necessary by the Director of the said School to teach the said and has also agreed to

pay him during the whole period of his stay at the said School at and after the rate of rupees per month and whereas the cost per annum of such education without any such allowance being included is estimated to be Rs. which shall be taken to be the actual cost for the purpose of these presents and whereas in consideration of such education and pay to be given to the said as aforesaid by the said Secretary of State and his successors in office and assigns the said has agreed with the said Secretary of State his successors in office and assigns that he will after completing his studies at the said School and if required to do so serve in the Forest Department of the Government of British India for a period of not less than five years during the whole of which time he will diligently and efficiently do all acts and discharge all duties which may be required of him to be done in his capacity as an officer of the said Department. AND WHEREAS the said Secretary of State has also on his part agreed that the said shall be paid for such service at and after the rate of not less than rupees per month and shall be entitled to all the rights and privileges in respect of pay pension and promotion accorded to officers of the said Department for the time being by the Rules and Regulations of the Department. AND WHEREAS for the purpose of securing and indemnifying the said Secretary of State his successors in office and assigns against all loss and damage which he or they might or may in any way suffer by reason of the said

leaving without permission the service of the said Secretary of State his successors in office or assigns in less than five years after the completion of his studies at the said School and for the purpose also of securing the refund to the said Secretary of State his successors in office and assigns of the total cost including the monthly payments made to the said while at the said School incurred by the said Secretary of State or his successors in office or assigns in respect of the education of the said

at the said School and in consideration of the payment and education so as aforesaid to be made and given to the said at the said School and as one of the conditions of the admission of the said

to the said School it has also been agreed that the said and the said and as his sureties should execute the above-written Bond subject to the condition hereinafter contained. Now the condition of the above-written Bond or obligation is such that if the said shall well and faithfully and diligently pursue his studies at the said School and qualify for the said forest service and shall also after completing his studies at the said Forest School and if so required to do serve the said Secretary of State his

successors in office and assigns in the Forest Department of the Government of British India or of any Local Government for a period of not less than five years and shall during the whole of such period diligently and efficiently do all acts and discharge all duties which may be required to be done by him in his capacity as an officer of the said Department and if the said

and or either of them their or either of their heirs executors administrators and representatives shall well and truly indemnify the said Secretary of State his successors in office and assigns against all loss and damage which he or they might or may in any way suffer by reason of the said giving cause for dismissal either while at the said School or while in the service of Government thereafter or of his leaving the service of the said Secretary of State his successors in office or assigns without permission in less than five years after the completion of the studies of the said

at the said School and if the said- and

or either of them their or either of their heirs executors administrators or representatives shall also pay to the said Secretary of State his successors in office or assigns all sum or sums in any way expended paid or incurred by the said Secretary of State his successors in office or assigns in respect of the education of the said

at the said School then the above-written Bond or obligation shall be void otherwise the same shall remain in full force and virtue. PROVIDED ALWAYS and it is hereby expressly agreed and declared that these presents shall be treated and considered as entered into under the orders of the Government of India for the performance by the said

and and

of a public duty and an act in which the public are interested within the meaning of section 74 of Act IX of 1872 of the Legislative Council of India.

IN WITNESS, &c.

Government of India, Financial Department, Notification No. $\frac{\text{S R.}}{4760}$, *of 29th November* 1892.

In exercise of the powers conferred by section 8 of the Indian Stamp Act (I of 1879), the Governor-General in Council is pleased to remit the duties payable on the agreements and security bonds required to be executed, under the rules to regulate appointments and promotions in the Provincial Forest Service, by students and their sureties previous to entry into the Forest School, Dehra Dún.

APPENDIX II.

Estimated probable minimum Expenditure which will be incurred by Students under instruction at the Forest School.

Items for which and time at which allowances are required.	For Students living in the Native Style.		For Students living in the European Style.
	Lower Class.	Upper Class.	Upper Class.
	Rs.	Rs.	Rs.
(i) Monthly subsistence allowance necessary to defray cost of food, clothes, rent, and sundries.	20	24	30
(ii) Allowance required for first cost of uniform and equipment, when the student first joins the School.	20	20	50
(iii) Cost of books and instruments, payable when the student first joins the School, or in two instalments, as the Director may decide.	25	60	60
(iv) Allowance necessary to meet expenses as regards outfit, *i.e.*, on first starting into camp about the end of October in the first year.	40	40	60
(v) Monthly allowance required to meet travelling expenses for seven months (November to May) in the first year, and five months (November to March) in the second year.	4	4	8
(vi) Additional allowance necessary to meet expenses of the Hill Tour in the middle of April in the first year.	9	12	20
(vii) Additional allowance required to meet the cost of the Punjáb Tour in January of the second year.	30	35	
(viii) Total of (ii) to (vii) for 21 months of Course ...	172	215	321
(ix) Average per mensem of (ii) to (vii) ...	8	10	15
(x) Total monthly average [(i) plus (ix)] ...	28	34	45
(xi) Monthly average, exclusive of travelling expenses [(iv) to (vii)].	22	28	35

SYLLABUSES OF THE SUBJECTS TAUGHT.

FORESTRY.

English Course.

SYLVICULTURE.

I.—The Composition of Forests.

1. *Trees.*—Definitions; their mode of growth and reproduction; requirements with regard to light, moisture, &c.; classification of trees; gregarious and non-gregarious species; indigenous and exotic species.

2. *Principal characters or requirements of trees,* illustrated by references to the more important forest species in India as regards—

Habitat;

Temperament;

Root system and aptitude to produce stool-shoots and suckers;

Fructification;

Usual dimensions, longevity, &c.;

Purposes for which used—

(1) wood, (2) accessory products.

3. *Crops.*—Their characters; spontaneous and artificial crops; pure and mixed crops; types of the more important forest crops in India.

4. *The struggle for existence*—Amongst individual trees in a forest crop; principal factors which influence this struggle under various circumstances; illustrations and examples in India.

5. *Pure and mixed crops.*—Relative advantages and disadvantages of each class under various circumstances. Rules for growing pure and mixed crops. Illustrations drawn from Indian forests.

Note.—This course extends over the whole of 21 months of instruction as follows:—

July 1 to October 31.—Rains term, 1st year. Sylviculture IV.
November 1 to March 31.—Winter term, 1st year. Sylviculture I. II. III.
April 1 to May 31.—Hill tour, 1st year. Utilization and practical sylviculture.
July 1 to October 31.—Rains term, 2nd year. Utilization and working-plans.
November 1 to March 15.—Winter term, 2nd year. Revision of whole subject.

II.—METHODS OF TREATING AND EXPLOITING FORESTS.

1. *Definitions of general principles.*—Organized and unmethodical exploitations; rules regarding the allocation of the fellings.

2. *The principal methods of treating or exploiting forests explained, with special reference to improvement fellings and regulation of the future stock, viz.:—*

High forest treated by the selection method.

Ditto clearance method; natural regeneration and artificial regeneration.

High forest treated by the uniform and group methods.

Simple coppice.

Coppice with standards.

Provisional methods of treatment, conversions, transformations, and restorations.

3. *Detailed examination of each of these methods of treatment.* Nature of crops and conditions under which each is especially suitable; manner of applying the method in each case; cultural operations required in connection with each.

4. *Example of the application of each of these methods to some of the more important or abundant Indian forest crops.*

III.—THE MAINTENANCE AND IMPROVEMENT OF FORESTS.

1. *Attention to be given to the soil in sylviculture.*

2. *Fostering operations in young crops:—*

Cleanings.

Thinnings.

Prunings.

3. *Other operations made with a view to the improvement of the crop, viz.:—*

Climber cutting, irrigation, and drainage works.

4. *Summary remarks regarding the causes of injury and the necessity and practicability of combating them—*

Fire-conservancy.

Grazing.

Rights and privileges in forests.

IV.—ARTIFICIAL CREATION AND RESTOCKING OF FORESTS.

1. *Methods by which trees may be reproduced artificially.*

2. *Collection, treatment, and storage of seed.*

3. *Direct sowings.*

4. *Whole area sowings*—(with cultivation; without cultivation).

5. *Partial sowings*—in strips, in patches and plots; in trenches and furrows; on ridges, in holes and hollows: cases in which each of these methods may be best employed.

6. *Obstacles to direct sowing.*—Obstacles commonly met with and means of overcoming them.

7. *Planting.*—Cases in which necessary: why generally preferable to direct sowings.

8. *Nursery management.*—Laying out the nursery; permanent and temporary nurseries; size of nursery; soil; manures; seed-beds; sowing the beds; season for sowing; treatment of the seed-beds after sowing; weeding and irrigation; transplanting in the nursery lines when necessary; precautions.

9. *Planting out.*—Properties of good transplants; manner of conducting operations; packing and transport of the planting material.

10. *Different methods of planting out.*—In pots or baskets; in holes, notches, and hollows; in trenches; on mounds and ridges; on platforms and trees: cases in which each of these methods may be successfully employed.

11. *Obstacles to planting frequently met with and methods of overcoming them.*—The artificial restocking of swampy or water-logged land, drifting sands and unstable slopes, barren soils, areas where rainfall is insufficient, &c.

12. *Relative advantages and disadvantages of direct sowing and planting compared.*

13. *Maintenance operations in a young plantation.*—Freeing the heads of young plants, cleaning, thinning, fencing, &c.

UTILIZATION.

I.—Working agency and organization of labour.

II.—Utilization of wood.

1. The technical properties of woods.

2. Classification of wood for purposes of sale.

3. The different wood-using industries and the quality and condition of the wood they respectively require.

4. Tools, &c., used for felling and conversion.

5. Felling.

6. Conversion, seasoning, and storage of wood.

7. Disposal and sale of wood.

III.—Utilization of minor produce.

1. Leaves, including grazing and fodder, and litter and manure.
2. Flowers and fruit.
3. Bark.
4. Minor produce obtained from wood, including dyes, tans, and other extracts, oil, acids, wood spirit, tar, &c.
5. Roots.
6. Exuded products, including sugary sap, gums, resins, varnishes, caoutchouc, &c.
7. Animal products, including lac, silk, honey, wax, hides, horns, also the regulation of hunting, shooting, and fishing.
8. Mineral products.

IV.—The principal minor forest industries.

1. Charcoal-making.
2. Manufacture of cutch and katha.
3. Distillation of sandalwood oil.
4. Preparation of resin and turpentine products.
5. Impregnation of timber.

WORKING-PLANS.

I.—General Principles and Definitions.

1. *Forest organization*, in what it consists; meaning of the term "Working-plan," its purpose and reason why required; constitution of the growing stock in organized forests.

2. *Meaning of terms employed in Working-Plans*—exploitability, exploitable age, felling or girdling rotation, possibility, permanent and provisional plans, provisional period, revenue, working-circle, block, compartment, method of treatment, permanent and provisional treatment, classes of fellings, regeneration fellings, improvement fellings.

II.—Field work required in connection with the preparation of a Working-Plan.

1. *Preliminary reconnaissance of the area;* information required with regard to it.

2. *Selection of methods of treatment to be applied and formation of working-circles.*

3. *Analysis of crop;* sub-division of area into blocks and compartments, and reasons for this sub-division; selection of the compartments, their size and boundaries.

4. *Description of the compartments;* degree of detail required; information to be recorded with regard to the (*a*) situation, (*b*) the soil, (*c*) the standing stock.

5. *Manner in which the description is drawn up;* graphic method of recording the nature of the crop; stock maps.

6. *Determination of the number of trees in a crop;* different methods employed to determine the number of trees; choice of a method; selection of plots in the method by sample plots; size classes of trees; manner of enumerating the trees; recording the results of the enumeration.

7. *Calculation of the volume of material in a crop;* cases in which used; methods of making the calculation; method by type trees; measurement of standing trees; measurement of felled trees; measurement of stacked timber.

8. *Determination of the exploitable age of trees;* method by readings on stumps; method by measurement with Presslers' gauge recording the results of the readings.

III.—The preparation of Working-Plans.

1. Working-Plan for a simple coppice.
2. " coppice with standards.
3. " seedling forest by the selection method.
4. " " methods of clearances and strip method.
5. Working-Plan for a seedling forest by the uniform method of successive fellings and thinnings.
6. Working-Plan having in view the regulation of the future stock.
7. Working-Plan for (Uebergangs period) transformation period.

IV.—The Working-Plan Report.

1. Order and arrangement of the subjects to be treated in a Working-Plan Report.
2. Code prescriptions regarding the preparation of Working-Plans and for securing adherence to them.

MATHEMATICS.

(With its Forest Application.)

English Course.

I.—Arithmetic and Algebra.

1. *Proportion*—Comparing rates for material and work in different districts.

2. *Arithmetical Progression* 3. *Geometrical* „	Application to calculation of increase of volume of growing stock or individual trees, &c.
4. *Interest, simple and compound.* 5. *Discount.* 6. *Present value.* 7. *Annuities.*	Applied to estimating the value of forests as they stand and value after a period of years; advantages accruing from capital expenditure on works improvement, or having for their object the cheapening of export or conversion charges.

8. *Logarithms*—to simplify calculations.

II.—Trigonometry.

1. English and French methods of sub-dividing angles.
2. Trigonometrical ratios.
3. „ of angles of 30°, 45°, 60°, 90°.
4. Logarithms and logarithm tables.
5. Heights and distances, with special reference to problems occurring in forestry and surveying.
6. Solution of triangles with and without the use of logarithms.

III.—Mensuration.

1. Applied to standing trees.
2. „ fallen trees.
3. „ timber in log.
4. „ converted timber.
5. „ firewood in stacks, &c.
6. „ charcoal.
7. „ earthwork.

IV.—Statics.

1. Definitions and preliminary ideas.
2. Pressure, tension, and weight.
3. Composition and resolution of forces acting at a point.
4. Resultant of parallel forces, the couple.
5. Moments.
6. The lever.

7. The balance and steelyard.

8. Pulleys.

PHYSICAL SCIENCE.

English Course.

I.—Chemistry.

1. Preliminary notions; nomenclature; symbols; formulæ; equations.

2. Elements; non-metals, metals.

3. Oxygen, its properties; its preparation; its occurrence in nature.

4. Hydrogen, its properties; its preparation; its occurrence in water.

5. Nitrogen, its properties; its preparation; its occurrence in air.

6. Oxides, bases, acids, alkalis, salts.

7. Ammonia, nitric acid, occurrence in nature.

8. Chlorine, bromine and iodine; hydrochloric acid.

9. Carbon and its different forms; combustion and the structure of flames; carbo-hydrates.

10. The oxides of carbon; their properties, their preparation, their occurrence in nature.

11. Sulphur; its properties, preparation and occurrence in nature; oxides of sulphur.

12. Phosphorus; its properties, preparation and occurrence in nature; phosphates.

13. Silica; its properties and occurrence in nature.

14. Metallic elements; groups; potassium, sodium, calcium, aluminium, magnesium, iron, copper.

II.—Physics.

1. Definition, branches, preliminary ideas.

2. Matter, its forms; mass, volume, weight.

3. Solids, liquids and gases; comparative properties; pressure; specific gravity.

4. Capillary phenomena; endosmose and exosmose.

5. Pressure of the atmosphere; the barometer; air-pump, common pump, force-pump, syphon.

6. Heat; expansion; the thermometer; fusion, sublimation, evaporation, ebullition, steam; distillation; conduction, convection, and radiation.

7. Light; reflection, refraction, telescope, microscope.

8. Magnetism; the magnetic needle and its applications.

III.—Physiography.

1. The earth and its position in the solar system; the sun, the moon; motions of the earth; day and night; the seasons.

2. The atmosphere, its density, depth and composition; dew and hoar-frost, fog, cloud, rain, hail, snow. The winds, their causes; the monsoons; trade winds; land and sea breezes.

3. The ocean; its distribution; depth; composition; currents; tides.

4. Rivers; catchment basins; watersheds and water partings; springs; mountain torrents; deltas; lakes, their movement.

5. Ice and snow; glaciers; moraines; icebergs.

6. Mountain chains; their character and distribution, cause of upheaval, valleys.

7. Denudation; action of the sea, of rivers and ice; action of the atmosphere; decomposition and disintegration of rock; formation of soil.

8. Internal heat of the earth; earthquakes, volcanoes, hot springs.

9. The land and its tenants. Distribution of land and water, general structure of the existing continents. Asia, its position and character. India, its rivers, mountains, plains, rainfall, seasons, winds.

10. Flora and Fauna; their relation to the temperature and rainfall. Zones of vegetation, especially tree.

IV.—Geology and Mineralogy.

1. Sedimentary rocks; their origin, varieties and composition; sandstone; conglomerates; shales.

2. Organic rocks; their origin, composition and characteristics; chalk; limestone; peat; coal.

3. Igneous rocks; their composition and origin; lava; trap, basalt, granite.

4. Metamorphic rocks; gneiss, mica, schist, marble, slate, quartzite.

5. Stratification; its cause; dip and strike; horizontal strata and inclined strata; faults.

6. Chronological orders of stratified rocks, characteristics of the great formations; organic remains (fossils) found in them.

7. Short account of Indian geology; characteristics of Peninsular and extra-Peninsular areas.

8. Chief physical properties of minerals; chemical composition and common tests.

9. Chief minerals of India; quartz, mica, felspar and kaolin; ores of iron, laterite, kunkur; lime-stone,' tufa,' &c.

V.—Soils.

1. Modes of formation.

2. Organic and inorganic constituents; soluble and insoluble ingredients.

3. Classification of soils; sand, clay, loam, humus.

4. Subsoil; surface soil; influence of organic life; influence of vegetation; influence of the circulation of water; influence of temperature.

5. Physical properties of soil; chemical properties; presence of gases.

6. The simple analysis of soils.

7. The improvement of soils; chief organic and inorganic manures and their effects.

BOTANY.

English and Vernacular Courses.

I.—Morphology.

1. The nature of plants as distinguished from animals.

2. Classification of plants.

   (*a*) Phanerogamous plants.

   (*b*) Cryptogamous plants.

3. Phanerogamous plants—their organs.

   (*a*) Organs of vegetation: root, stem, leaves.

   (*b*) Organs of production: flower, fruit, seed.

4. The *root*: fibrous, tuberous, taproots.

   Underground stems or rhizomes: tubers, bulbs, corms.

5. The *stem*: erect, prostrate, creeping, climbing, cæspitose, culms.

Branches: their arrangements and sub-divisions.

6. The *leaves:* petiole, blade, stipules.

Simple and compound leaves, entire or lobed leaves, opposite and alternate leaves, the various shapes of leaves.

7. The *inflorescence:* terminal or auxiliary, centrifugal or centripetal: spike, raceme, panicle, head, umbel, cyme, corymb, thyrsus, catkin, spadix, spikelet.

Bracts, involucre, spathe, glumes.

8. The *flower:* perfect and imperfect; monœcious, diœcious or polygamous; dichlamydeous, monochlamydeous.

Parts of the flower: calyx, corolla, stamens, pistil.

9. The *corolla:* gamopetalous, polypetalous, regular or irregular.

Its shape, æstivation, and colour.

10. The *stamens:* filament, anther, pollen.

Arrangement of stamens: monadelphous, diadelphous, &c, didynamous, syngenesious, gynandrous, &c.

11. The *pistil:* ovary, ovule, style, stigma.

Ovary: syncarpous, apocarpous; placentation, axile and parietal. Ovule: straight, incurved, inverted.

12. The *fruit:* simple and compound; dry and succulent; dehiscent and indehiscent.

Kinds of fruit: berry, drupe, capsule, pod, nut, samara, follicle, siliqua, pome, pepo, cone, caryopsis.

13. The *seed:* testa, tegmen, embryo, albumen, funicle, aril, hilum, micropyle; the embryo: radicle and plumule, cotyledons.

14. *Accessory organs:*—Thorns, prickles, tendrils, hairs, glands.

II.—Anatomy.

1. The *cell:* nature of the cell, cell-wall, protoplasm, formation of new cells, substances contained in protoplasm, cell sap.

2. *Tissue:*—

(*a*) Cellular tissue—

(1) Epidermis: epidermal cells, stomata, hair structures.

(2) Cork.

(3) Parenchyma.

(*b*) Sclerenchyma: short elements, long elements or fibres.

(*c*) Secretory reservoirs: sacs containing crystals, sacs containing mucilage, sacs containing resins and gum resins, tannin sacs.

(*d*) Tracheæ :—

(1) vessels ;

(2) tracheides.

(*e*) Sieve-tubes.

(*f*) Laticiferous ducts : latex.

(*g*) Intercellular spaces : intercellular secretory reservoirs ; intercellular spaces containing air and water.

3. Structure of the root—

(*a*) primary or tap root ;

(*b*) secondary or lateral roots and rootlets ;

(*c*) secondary thickening ;

(*d*) root hairs.

4. Structure of the stem—

(*a*) Angiosperms :

(1) herbaceous type, young, mature.

(2) woody type immediately after germination ; after formation of primary bundles, when secondary growth in thickness has begun.

(*b*) Gymnosperms (similar divisions).

(*c*) Monocotyledons—

(1) herbaceous type ;

(2) arboreous type ; no secondary thickening : palms, bamboos ; with secondary thickening : Liliaceæ.

5. Structure of the leaf—

(*a*) Angiosperms—

(1) petiole ;

(2) blade : bifacial type, centric type.

(*b*) Gymnosperms.

(*c*) Monocotyledons.

6. Structure of the reproductive organs : structure of the pollen grain ; structure of the embryo ; fertilization.

7. *Fungi.*—Structure, reproduction.

III.—Physiology.

1. *The external conditions of plant life :* temperature, light, gravitation, periodicity of temperature and light.

2. *The internal conditions of plant life :* diosmose ; turgescence ; tissue—tensions.

3. *Nutrition*—

(*a*) Absorption of moisture and nutritive matter in solution by the roots; nutritive materials so obtained.

(*b*) Transpiration.

(*c*) Assimilation; taking up and fixing of carbon by the leaves; other bodies absorbed by the leaves.

(*d*) Metabolism; change of nutritive materials, *e.g.*, starch into other nutritive substances; reserve materials; ferments; dormant periods.

(*e*) Passage of the elaborated materials through the tissues.

(*f*) Respiration.

(*g*) Ascent of water.

Growth—

(*a*) The three phases of growth: embryonic growth, elongation, completion of internal differentiation.

(*b*) Formation of organs at the growing point: development of leaves, buds, and branches, internodes.

(*c*) Correlations of the different organs: influence of growing shoots on other shoots; organs of like kinds complete for the same constructive materials, hence scale leaves and dormant buds; influence of root activity on the functions of leaves.

(*d*) Nutations and torsions due to unequal growth.

IV.—Wounds and Diseases.

1. Healing up of wounds—

(*a*) in herbaceous parts; bark abrasures;

(*b*) in woody parts; cuts extending to the wood.

2. Parasites; their action—

(*a*) flowering parasites—

(1) root parasites: Orobanche, &c.;

(2) stem and branch parasites: Loranthus, &c.

(*b*) Fungi:—

(1) parasitic: those entering by the roots; those which enter by wounds; those which attack the leaves.

(2) saprophytic.

3. Injuries caused by atmospheric phenomena:—

(*a*) temperature: frost, excessive heat, alternations of heat and cold.

(*b*) winds: hot winds, storms.

4. Injuries by fire.

V.—Classification.

1. Classification of plants: classes, orders, genera, species, varieties, individuals.

2. Divisions of phanerogams: Dicotyledons and Monocotyledons, characters of the two groups in seed, leaf, stem, &c.

3. Divisions of Dicotyledons—

Angiosperms, with seed enclosed in a pericarp;
Gymnosperms, with naked seeds.

4. Angiospermous plants—

(*a*) Polypetalæ, subdivided into Thalamifloræ and Calycifloræ.
(*b*) Gamopetalæ.
(*c*) Apetalæ.

(Characters of each.)

5. Thalamiflorous orders, especially those of forest consequence. Some of the following:—

(*a*) Dilleniaceæ;	(*h*) Sterculiaceæ;
(*b*) Magnoliaceæ;	(*i*) Tiliaceæ;
(*c*) Anonaceæ;	(*j*) Rutaceæ;
(*d*) Guttiferæ;	(*k*) Burseraceæ;
(*e*) Ternströmiaceæ;	(*l*) Meliaceæ;
(*f*) Dipterocarpeæ;	(*m*) Sapindaceæ;
(*g*) Malvaceæ;	(*n*) Anacardiaceæ;

Give an analysis, enabling each to be determined.

6. Calyciflorous orders, especially those of forest consequence. Some of the following:—

(*a*) Leguminosæ;	(*e*) Myrtaceæ;
(*b*) Rosaceæ;	(*f*) Lythrarieæ;
(*c*) Rhizophoreæ;	(*g*) Samydaceæ;
(*d*) Combretaceæ;	(*h*) Cornaceæ;

Give an analysis, enabling each to be determined.

7. Gamopetalous orders, especially those of forest consequence:—

(*a*) Rubiaceæ;	(*g*) Loganiaceæ;
(*b*) Ericaceæ;	(*h*) Boragineæ;
(*c*) Sapotaceæ;	(*i*) Bignoniaceæ;
(*d*) Ebenaceæ;	(*j*) Acanthaceæ;
(*e*) Oleaceæ;	(*k*) Verbenaceæ;
(*f*) Apocyneæ;	(*l*) Labiatæ;

Give an analysis, enabling each to be determined.

8. Apetalous orders, of forest consequence. Some of the following:—

(*a*) Santalaceæ;
(*b*) Lauraceæ;
(*c*) Urticaceæ;
(*d*) Euphorbiaceæ;
(*e*) Cupuliferæ;
(*f*) Juglandeæ;
(*g*) Salicineæ;

with analysis.

9. Gymnosperms; the two chief orders of which are—

(*a*) Coniferæ.
(*b*) Cycadaceæ.

10. Monocotyledons. The following being those of chief importance:—

(*a*) Palmæ.
(*b*) Liliaceæ.
(*c*) Gramineæ.

11. Cryptogamæ—Plants with no stamens or ovaries, spores of single cells:—

Group I—Vascular cryptogams.
" II—Muscineæ.
" III—Thallophytes.

12. Vascular cryptogams, chief family of forest interest.

(*a*) Filices.

13. *Muscineæ.*—Mosses in respect to their influence on the soil, on tree trunks, &c.

14. *Thallophytes.*—Algæ and Fungi, separated by presence and absence of Chlorophyll; former of but slight forest interest; latter often of great importance.

15. *Fungi.*—As causes of decomposition and disease. Very short account of the chief families of forest interest:—

(*a*) Schizomycetes, causes of disease.
(*b*) Saccharomycetes, ferments.
(*c*) Peronosporeæ, leaf diseases.
(*d*) Uredineæ, rusts, Æcidia, &c.
(*e*) Hymenomycetes, chief species as Agaricus, Polyporus, Trametes, Merulius, destructive to trees and timber.

16. The collection and preparation of specimens.

VI.—GEOGRAPHY.

1. General distribution of forests and cultivated plants.

2. Chief trees of India, their distribution.

3. Chief regions or zones of vegetation, and their relationship to the rainfall.

4. Chief classes of Indian forests, conifer forests, oak forests, forests of the arid region, sál forests, mixed forests, evergreen forests, littoral forests, humid forests.

FOREST ZOOLOGY.

A.—THEORETICAL COURSE.

1. Explanations, with illustrations, of technical terms.

2. Classification of animals, reduced as far as possible to analytical tables.

3. Anatomy and morphology of insects.

4. Examination of types as an introduction to the general study of Zoology (after the plan of Huxley's 'Crayfish.')

5. The study of animals which are useful or the reverse to forests and trees, illustrated as far as possible by diagrams from Indian subjects.

B.—PRACTICAL COURSE.

1. Dissection of the types considered under A4.

2. Identification of specimens.

3. Collection and preservation of specimens.

DRAWING, SURVEYING, AND ESTIMATING.*

English Course.

I.—DRAWING.

A.—*Theoretical Course*—

1. Freehand.

2. Model.

* NOTE.—This course extends over the whole 21 months of the instruction as follows:—

Rains term	...	1st year	... I. A.; I. B. 1 to 4; II. A.
Winter "	...	"	... II. B. 1 to 6.
Hill Tour	...	"	... Visit to works and notes on roads, bridges, houses, &c.
Rains term	...	2nd year	... I. B. 5 to 8; III.
Winter "	...	"	... II. B. 7.

3. Problems in geometrical drawing which will be of use in Surveying Course and are necessary for construction of scales, &c.
4. Explanation of terms plan, section, elevation.
5. Use of the more simple instruments, such as the compass, parallel ruler, set squares, &c.
6. Conventional signs and colouring, printing.
7. Hill shading, contour lines.

B.—*Practical Course*—

1. Copying maps, tracing maps.
2. Construction of scales.
3. Enlargement and reduction of maps—
   Pentagraph.
   Method by squares.
   With proportional compasses.
4. Calculation of areas, by triangles, by co-ordinates, by acre comb, by planimeter.
5. Plotting and drawing the results of surveying exercises.
6. Ditto ditto levelling.
7. Ditto ditto independent survey.
8. Ditto ditto road and house and other projects,

II.—Surveying.

A.—*Theoretical Course*—

1. Chain surveying, maintenance and form of field-books.
2. Survey with prismatic compass and chain, field-book, plotting with protractor.
3. Plane-table survey.
4. Levelling—form of field-book, &c.

B.—*Practical Course*—

1. Chain survey.
2. Traverse of roads with prismatic compass and chain.
3. Traverse of boundary of a closed area with prismatic compass and chain. Plotting, rectification of small errors.
4. Plane-table survey.
5. Levelling.
6. Use of maps in the field.

7. Survey (unaided), with prismatic compass and chain, of about a square mile of land, filling in details with plane-table, and levelling or circuit of about half a mile.

III.—Estimating.

A.—*Theoretical*—

1. Projection of lines, outlines of solid geometry.
2. Estimation of volume of earthwork and cost of excavation.
3. Estimation of wall-work, timber, &c.
4. Form of estimate, plan, and specification.

B.—*Practical*—

1. Road project, including—
   (*a*) traverse of road with prismatic compass and chain.
   (*b*) longitudinal section along centre line.
   (*c*) cross sections.
2. Plan, elevation, and section of a simple wooden bridge, with estimates for ditto.
3. Plan, elevation, and sections of a masonry culvert.
4. Plan, elevation, and sections of a Range Head-quarters house.
5. Repairs to houses and estimates for ditto.

FOREST ENGINEERING.

English Course.

I.—*Building Materials*—

1. Stone—
   (*a*) The various qualities.
   (*b*) Method of extraction and preparation.
2. Brick—
   (*a*) The various qualities.
   (*b*) Preparation, including the various methods of moulding and burning.
3. Earth—
   (*a*) Qualities suitable for building.
   (*b*) Method of preparation.
4. Tiles—Flat and hollow; method of manufacture.

5. Lime—
   (*a*) Various qualities of limestone.
   (*b*) Preparation.
   (*c*) Storing.
   (*d*) Its different uses in construction.
6. Timber—
   (*a*) Preparation and seasoning.
   (*b*) Suitability for various parts of the structure, in reference to qualities of various species.
   (*c*) Some of the more important timbers used in construction—Teak, Sál, Deodar, &c.
   (*d*) Preparations for preserving and beautifying wood: paints, varnishes, tar, &c.
   (*e*) Carpentry and joinery, including the more common and useful joints, scarfs, mortices, trusses and scantlings, doors, windows, railings, &c.

II.—*Building*—

1. Foundations—
   (*a*) Selection of site; soils.
   (*b*) Excavation.
   (*c*) Materials used, concretes.
   (*d*) Plinths.
2. Walls—
   (*a*) Construction in various materials.
   (*b*) Thickness relatively to height and nature of roofing.
3. Arches: in doorways, culverts, and roofs.
4. Floors: terraced, tiled, wooden, asphalt, earth. Construction and protection from insects and damp.
5. Roofs—
   (*a*) Terraced, tiled, shingle, thatched, iron roofs. Construction and comparative advantages of weight, durability, coolness, and cost.
   (*b*) Method of support, beams, trusses, rails, &c.
6. Chimneys and fireplaces. Main principles of construction, including safety chimneys, flues, &c.
7. Drainage, lightning conductors, and other details.
8. Plans, specifications, estimates, and especially working drawings.

III.—*Road-making*—

1. Roads, temporary and permanent, cart-roads, sledge-roads, inspection and bridle-paths in the hills and plains.
2. Alignment of roads in hills and plains as affected by necessities of export, such as carriage employed and direction of export, with special reference to gradients and avoidance of physical difficulties.
3. Methods of laying out roads in level country, or in country with definite gradients, with levels, road-tracers, &c.; curves, drainage, &c.
4. Construction, earthwork, stone-cutting, and rock-blasting, embankments and cuttings, metalling.
5. Estimates.

IV.—*Bridges*—

1. General principles regulating height and span.
2. Different principles employed in construction.
3. Selection of sites and laying out approaches.
4. Simple wooden bridges and with trusses.
5. Simple wire-rope bridges.
6. Rail bridges.
7. Masonry culverts.
8. Estimates.

V.—*Transport of Timber*—

1. Simple transport carriage by carts, beasts of burden, and coolies.
2. Sledge-roads.
3. Tramways.
4. Wet and dry slides.
5. Transport by water, including rafting and floating.

VI.—*Wells*—

1. Permanent and temporary, wood and masonry.
2. Selection of sites in reference to the various soils.
3. Construction; methods of sinking.
4. Cleaning and protection.

VII.—*Water and River Bank Works*—

1. Embankments and dams for retaining water.
2. Simple canals.

3. Masonry bunds for protection of river and torrent banks.
4. Spurs and cribs for ditto.

VIII.—*Demarcation*—

1. Boundary marks: various kinds of marks used according to character of country and materials available.
2. Boundary lines, rides, and roads.
3. Block and compartment lines.

FOREST LAW.

English Course.

General Notions regarding Property.

I.—General Law—

1. Of property and its acquisition.
2. Of possession.
3. The consequences of possession.
4. The transfer of property.

General Notions regarding Rights and Servitudes.

5. Their nature.
6. Distinction between servitudes and ownership.

The Easements Act, and Statute of Limitations.

Of Government Property and its Acquisition.

7. Estates held by succession from former Governments.
8. Lands occupied by roads, canals, river-beds, railways, &c.
9. Waste lands.
10. Lands acquired for public purposes.

II.—Forest Law—

Of Forest Law in India.

1. Reasons for special law.
2. Forest Laws in Europe and in India. The Indian Forest Acts and Regulations.
3. To what lands the special laws apply.
4. The constitution of permanent Forest Estates in India.
5. Of the protection of trees and natural produce on lands not being forests.

The Limitation to which Rights of User are subject.

6. The principle that rights must be limited and regulated.
7. The extent of the limitation.
8. Principles of regulation applied to different classes of rights.
9. Grazing rights.
10. Grass-cutting.
11. Lopping for fodder and leaf gathering.
12. Wood rights.
13. Removal of dead leaves.
14. Other forest produce.
15. Hunting and shooting.
16. Temporary and shifting cultivation.

The Procedure for Constituting Permanent Forest Estates.

17. The preliminary steps. Difference of procedure under different Acts. Rules for the conduct of Forest Settlement procedure. Importance of exact adherence to legal procedure.
18. Claims to land.
19. Claims to rights of way or of water.
20. Claims to other forest rights.
21. Definition of rights admitted to exist.
22. Method of providing for admitted and defined rights.
23. Commutation of forest rights.
24. Extinction of unclaimed rights.
25. Appeals from orders of a Forest Settlement Officer or Court.
26. Final notification. Importance of accurate description.
27. Forests reserved previous to the passing of the different Acts.
28. Privileges and concessions granted by Government, though not legally proved to be rights of the nature of easements; their regulation.
29. Village forests.
30. Protected forests.
31. Undivided or shared forests.
32. Control over private forests.
33. Rules made under the various Forest Acts and Regulations.

III.—CRIMINAL LAW APPLIED TO THE PROTECTION OF FORESTS AND THEIR PRODUCE IN TRANSIT—

1. Protection against natural calamities.
2. Protection against fire.
3. Protection against offences by human agency.
4. Preventive provisions.
5. The law under which offences are punished.

Application of the Forest Acts to Forest Offences.

6. Offences against the forest itself—
   (*a*) Reserved forests.
   (*b*) Protected forests.
7. Special offences.
8. Cattle trespass. The Cattle Trespass Act.
9. Control of timber in transit and offences connected with it—
   (*a*) Transit by land.
   (*b*) Ditto water.
   (*c*) Drift timber and salving.
   (*d*) Rules regarding drift timber and its disposal.

Application of the Penal Code to Forest Offences.

10. Offences directly connected with a forest or its produce—
    (*a*) Theft or criminal misappropriation.
    (*b*) Receiving stolen property.
    (*c*) Mischief.
    (*d*) Abetment of offences.
    (*e*) Criminal trespass.
    (*f*) Attempt to commit offences.
11. Offences indirectly connected with a forest or its produce—
    (*a*) Unlawful assembly.
    (*b*) Omitting to give aid and information.
    (*c*) Giving false information.
    (*d*) Giving false evidence.
    (*e*) Concealing offenders.

General Principles of Criminal Law relating to Offences.

12. General exceptions (excusing offences).
13. Circumstances aggravating offences.

14. Limitation of time for prosecution.

15. Remarks on conduct of prosecution.

The Legal Principles of punishment.

16. Imprisonment and fine.

17. Confiscation as a punishment under Forest Law.

The Criminal Procedure Law.

18. Complement to the penal laws.

19. Investigation by the Police—

(*a*) Cognizable offences.

(*b*) Non-cognizable.

20. Cases on complaint to the Magistrate.

21. The process of Criminal Courts.

22. Criminal trials.

23. Method of obtaining attendance of witness; record of evidence; notes on the Evidence Act.

24. The charges.

25. Execution of sentence and recovery of fines.

26. Appeal and revision.

IV.—THE FOREST SERVICE—

1. General nature of the Forest Service.

2. The appointment of Forest Officers and organization of the service.

3. The special responsibilities of Forest Officers.

4. The protection extended by law to Forest Officers.

5. The legal powers of Forest Officers.

6. Offences against the authority of public servants.

FOREST ACCOUNTS AND PROCEDURE.

English and Vernacular Courses.

I.—*General Principles of book-keeping by single entry.*

II.—*Cash Accounst*—

(*a*) Classification of Revenue and Expenditure.

(*b*) "Capital" and "Ordinary Expenditure," and powers of sanction.

(*c*) The Cash Book and how to keep it.

(*d*) Advances and recoveries of cash, and how they should be dealt with.

(*e*) Vouchers and registers subsidiary to the cash book.

(*f*) Revenue, and procedure as to receiving, remitting, or refunding same.

(*g*) The divisional cash accounts and monthly returns. How to prepare them.

III.—*Forest produce and yield returns*—

(*a*) Accounts and returns connected with the departmental export of produce.

(*b*) Accounts and returns connected with the removal of produce by purchasers.

(*c*) Working Plan returns and forest journals.

IV.—*General Procedure*—

(*a*) Correspondence—how to be dealt with, registers to be kept up, and rules regarding records.

(*b*) Transfer of charge.

Time Table for

SENIOR

Time.	Subject.	Day of the Week.	Room.
7 to 8-30 A.M. ...	Accounts ...	Tuesday, Thursday...	Western Lecture Room
	Drawing ...	Monday, Wednesday, Friday.	Corridor and Central Lecture Room.
8-30 to 10 A.M. ...	Surveying and Forest Engineering.	Daily July and August.	Drawing Hall ...
	Zoology ...	Daily September and October.	Eastern Lecture Room.
12 noon to 1-30 P.M.	Forestry ...	Daily ...	Central Lecture Room
1-30 to 3 P.M. ...	Forest Law ...	Daily July and August.	Eastern Lecture Room.
	Forest Engineering.	Daily September ...	Drawing Hall ...
	Botany ...	Daily October ...	Central Lecture Room.
4—5 P.M. ...	Drill ...	Tuesdays and Thursdays.	

SENIOR

7 to 8-30 A.M. ...	Accounts ...	Tuesday, Thursday	Western Lecture Room.
	Drawing ...	Monday, Wednesday, Friday.	Western small room
8-30 to 10 A.M....	Surveying and Forest Engineering.	Daily ...	Drawing Hall ...
12 noon to 1-30 P.M.	Forestry ...	" ...	Eastern small Lecture Room.
1-30 to 3 P.M. ...	Forest Law ...	Tuesday, Thursday ...	" ...
	Botany ...	Monday, Wednesday, Friday.	Western small Lecture Room.
4—5 P.M. ...	Drill ...	Tuesdays and Thursdays.	

Rains Term, 1892.

UPPER CLASS.

Name of Professor.	Remarks.
Babu Kasheeshwar Mukarjee, Head Clerk, School Circle.	General Principles I, July 2, 7; Cash Accounts II, July 9th to August 13th; Returns III, August 18th to September 3rd; Procedure IV, September 8th to 15th; Practical Examples till October 27th.
The Instructors	Drawing I, B 5 to 8; estimating B.
Instructor, Mr. C. G. Rogers ...	Estimating A in July, Forest Engineering IV to VIII, August.
Mr. E. C. Cotes, Deputy Superintendent, Calcutta Central Museum.	Zoology.
Deputy Director	Utilization, July, August; Working Plans, September, October.
Mr. N. Hearle, Deputy Conservator of Forests.	
Instructor, Mr. C. G. Rogers ...	Revision of Course.
Mr. J. F. Duthie.	
LOWER CLASS.	
Babu Kasheeshwar Mukarjee ...	With Senior Upper Class.
The Instructors.	
Vernacular Instructor.	
Hindustani Instructor.	
Ditto.	
Babu Birbal.	

Time Table for Rains

JUNIOR

Time.	Subject.	Day of the Week.	Room.
7 to 8-30 A.M. ...	Forestry ...	Tuesday, Thursday...	Central Lecture Room.
	Drawing ...	Monday, Wednesday, Friday.	Drawing Hall ...
8 30 to 10 A M....	Natural Science	Daily ...	Western Lecture Room.
12 noon to 1-30 P.M.	Surveying and Forest Engineering.	" ...	Drawing Hall ...
1-30 to 3 P.M. ...	Mathematics ...	Tuesday, Thursday...	Western Lecture Room.
	Botany ...	Monday, Wednesday, Friday.	" ...
4—5 P M. ...	Drill ...	Tuesdays and Thursdays.	

JUNIOR

Time.	Subject.	Day of the Week.	Room.
7 to 8-30 A.M. ..	Forestry ...	Tuesday, Thursday...	Eastern small Lecture Room.
	Drawing ...	Monday, Wednesday, Friday.	Drawing Hall ...
8-30 to 9-30 A.M.	Mathematics ...	Daily ...	Western small Lecture Room.
12 noon to 1-30 P.M.	Natural Science Forest Engineering.	July 1—September 15 September 15—October 31.	" ...
1-30 to 3 P.M. ...	Forest Law ...	Tuesday, Thursday...	Eastern small Lecture Room
	Botany ...	Monday, Wednesday, Friday.	Western small Lecture Room.
4—5 P.M. ...	Drill ...	Tuesdays and Thursdays.	

Term, 1892—(*continued*).

UPPER CLASS.

Name of Professor.	Remarks.
Deputy Director	Sylviculture SIV, Artificial Reproduction.
The Instructors	Drawing I, B 1 to 4.
Instructor, Mr. A. F. Gradon ...	Chemistry, July 1st to 23rd; Physics, July 24th to August 17th; Physiography, August 18th to September 11th; Geology, September 14th to October 16th; Soils, October 7th to October 28th.
Instructor, Mr. C. G. Rogers ...	Drawing IA, 1st to 7th July; Surveying IIA, August; Forest Engineering I, II, III, September, October.
Mr. A. P. Grenfell, Asst. Conservator of Forests.	Algebra I, to July 28th; Trigonometry II, to August 18th, Mensuration III, to September 15th, Statics IV, to October 18th; Dynamics and Hydrostatics V, VI, to October 27th.
Instructor, Mr. A. F. Gradon ...	Morphology I, July 1st to 24th; Anatomy II, July 27th to August 21st; Physiology III, August 24th to September 14th; Wounds and Diseases IV, September 21st to October 14th; Geography VI, October 16th to 28th.
LOWER CLASS.	
Hindustani Instructor.	
The Instructors.	
Babu Gopal Singh	9-30 to 10. Exercises.
Babu Birbal, Forest Ranger. Hindustani Instructor.	
Hindustani Instructor ...	With Senior Lower Class.
Babu Birbal	" "

List of Students on January 1st, 1893.

Senior Students (Entered July 1st, 1891).

Upper Class.

Ram Nath Mukerjee	Assam.
Kali Charan Varma	N.-W. P. and Oudh.
Kanhya Lal	
Ram Chandra	
Gurditta Mal	Punjáb.
Bodh Raj	
Gurbakhsh Rai	
Duni Chand	
Abdul Haq	
R. H. Cole	Central Provinces.
Dhanjishah Avasia	
Rajagopal Naidu	Madras.
A. P. Ramachandra Mudaliar	
T. Munisawmy Naicker	
N. S. Anantacharlu	
L. Venkanna	
S. Kuppusawmy Chetty	
A. B. Myers	
K. Gajaraju Mudaliar	
W. B. Jackson	
H. E. Kelly	
E. J. D. Pierce	
S. Ramasawmiah Iyer	
T. Arumugam Mudaliar	
P. Venkatakrishnamah Naidu	
C. E. Allen	
T. S. Brito	
V. Ethirajulu Naidu	Coorg.
W. J. Lane Ryan	Burma.
Hari Keshav Washikar	Kolhapur State.
Gopal Krishna	Hyderabad State.
Krishnaji Javadekar	
A. M. Sawyer	Travancore State.
Bhawani Das	Jodhpur State.
P. S. Govinda Rao	Mysore State.
W. G. J. Peake	Private.
D. H. Allan	
R. L. Pocock	
C. S Rogers	
J A. Firth	
R. F. Colaço	

Lower Class.

Harji Ram	N.-W. P. and Oudh.
Shyam Sundra	Jeypur State.
Akbar Khan	Private.
Sunder Lal	

Junior Students (Entered July 1st, 1892).

Upper Class.

R G. A. Hannah	Bengal.
Kanhya Lal (2)	N.-W. P. and Oudh.
Ram Swarup	
Hukam Chand	
M. Corbett	
A. D. Pal	

Upper Class—(continued).

Khadim Husain	Punjáb.
Ratan Chand	
Sita Ram	
Ilm Din	
C. A. Webb	Central Provinces.
J. F. Anthony	
P. Shunkernath	
J. D. St. Joseph	
R. C. Pinder	
Vithal Dhondo	
F. J. Langhorne	
S. A. Wood	Burma.
Maung Po Yin	
Maung Aung Thu	
F. J. Rivett	Madras.
P. M. Narasa Iyer	
C. C. Vieyra	
A. Subba Row	
J. A. Daly	
K. G. Subba Row	
Syed Burham-ud-din	
S. P. Kulasekram Chetty	
C. V. Ryan	
E. H. Monisse	
M. Panchipikesa Iyer	
T. V. Armugam Pillai	
C. S. Jesudasen Pillai	
Syed Edulla Saib	
E. A. Partridge	Hyderabad State.
D. Shanker Bhanap	
T. C. Legge	Private.
J. F. Tweedie	
C. A. Ramakristna Iyer	
Vaswami Dalpatrai	
Lalwani Dayaram	
T. I. Pocock	
M. Narasinga Row	
K. Rama Row	
D. Raja Row	
B. Srinivasa Row	
Parmeshwar Das	
P. S. Vasudeva Row	

Lower Class.

Durga Dutt	N.-W. P. and Oudh.
Ranjit Singh	
Daulat Singh	
Raghunath Prasad	Central Provinces.
Mahomed Yasin	
Hakumat Rai	Punjáb.
Sakhawat Husain	Jeypur State.
Ralia Ram	Private.
Kundan Lal	
Sundar Lal (2)	

List of Passed Students of

Name.	Date of Certificate.	Character of Certificate.
J. C. Mendes	1881 ...	R.
Shama Churn Chuckerbutty	" ...	R.
A. E. Lowrie	1882 ...	S A C.
Karuna Nidhan Mukerji	" ...	S.A.C.
Fazl Din (II)	" ...	R.
Moti Singh	28th Nov. " ...	R.
Daulat Ram Bimbhat	" " ...	R.
Kirpa Nath De	" " ...	R.
Chunder Kumar Chatterji	" " ...	S A.C.
Jogèsvar Sûr	1st Nov. 1883 ..	R.
Mahadeo Rao Palnaitkar	" " ...	R.
C Ingram	" " ...	R.
Sadhu Singh	" " ...	R.
Raghunath Pathak	" " ...	R.
Kedar Nath Mozumdar	" " ..	R.
Dina Nath Kar	" " ..	R.
Rama Nand	" " ...	R.
Sundar Lal	" " ...	R.
Ghulam Mahomed (I)	" " ...	R.
Gurditt Singh	" " ...	R.
Bhulan	" " ..	R.
Nanak Chand	1st Jan. 1884 ...	F.
Maung H Po	" " ..	F.
Maung Tun	" " ...	F.
Ram Narayan	" " ...	F.
Tara Kisor Gupta	Dec. " ...	R.*
Harswarup (I)	" " ...	R.*
Gokal Das	" " ...	R.
Thakur Das	" " ...	R.
Ghulam Mahomed (II)	" " ...	R.
V. S. Gurunatha Pillai	" " ...	R.
Sada Nand Gairola	" " ...	R.
Narayen Prashad	" " ...	R.
Tincauri Chaudhri	" " ..	R.
Mansukh Rai	" " ...	R.
Rakhal Das Mukerji	" " ...	R.
Maung Shwe Ka	" " ...	R.
Jai Kishen	" " ...	R.
Maung Thakado	" " ...	R.
Abdul Rahman Sahib	" " ...	F.
Atama Ram	4th Jan. 1885 ...	R.
Devi Datta	" " ...	R.
C. P. Howell	" " ...	R.
Keshava Nand	" " ...	R.*
Nand Mal	" " ...	R.
C. M. Madurnayagam Pillai	" " ..	R.
Kongundra Ponnappa	" " ...	R.
Sundar Das	" " ...	R.
C. L Toussaint	" " ...	R.
Maung Khan Hein	" " ...	F.

the Imperial Forest School.

Where employed on 1st January 1893.	Rank on 1st January 1893.
Bengal...	Extra Assistant Conservator.
"	" " "
Central Provinces	Assistant Conservator.
N.-W. P. and Oudh ...	Extra Assistant Conservator.
Panjáb..	" " "
"	Forest Ranger.
Jodhpur State	Supdt. of Forest Department.
Assam	Forest Ranger.
Central Provinces	Extra Assistant Conservator.
Assam	" " "
...	(Deceased).
Burma	Extra Assistant Conservator.
Panjáb...	" " "
N.-W. P. and Oudh ...	" " "
Bengal...	Forest Ranger, Offg. Extra Asst. Consr.
...	(Deceased).
Panjáb...	Forest Ranger.
Patiala State	Chief Forest Officer.
Panjáb...	Forest Ranger.
Kapurthala State	" Officer.
Berar	Extra Assistant Conservator.
...	(Deceased).
Burma	Forest Ranger.
"	" "
N.-W. P. and Oudh ...	" "
Assam	Extra Assistant Conservator.
N.-W. P. and Oudh ...	" " "
Panjáb	Forest Ranger.
"	" "
"	" "
Madras	Extra Assistant Conservator.
N.-W. P. and Oudh ...	" " "
Central Provinces ...	Forest Ranger.
...	(Deceased).
Berar	Extra Assistant Conservator.
...	(Resigned).
Burma...	Extra Assistant Conservator.
Panjáb...	Forest Ranger.
Burma	Extra Assistant Conservator.
Madras...	Forester.
Panjáb...	Forest Ranger.
"	" "
Madras	Extra Assistant Conservator.
N.-W. P. and Oudh ...	" " "
Ajmere...	Forest Ranger.
Madras	" "
Coorg	" "
Panjáb...	" "
Burma	Assistant Conservator.
"	Myook.

List of Passed Students of the

Name.	Date of Certificate.	Character of Certificate.
Gour Krishna Sircar	30th October 1885 ...	F.
Harswarup (II)	" " ...	F.
Bagh Singh	1st January 1887 ...	F.
Mukandi Lal	" " ...	F.
Pancham Singh	" " ...	F.
Rama Dutt	" " ...	F.
Upendra Dutt	" " ...	F.
E M. Buchanan	3rd March " ...	R *
Ramaswami Ayer	" " ...	R.*
Sita Ramaiya	" " ...	R.*
Venkata Narain Appa	" " ..	R.*
T Bapá Rao	" " ...	R.
Chintamani Joshi	" " ...	R.
V. C. Doraswami Pillai	" " ...	R.
Jawala Parshad	" " ...	R.
L. A R. Kershaw...	" " ...	R.
S. C. Moss	" " ...	R.
Manbir Gurang	" " ...	R.
Mulraj	" " ...	R.
K. Narayana Swami Aiyar	" " ...	R.
Parmeswari Din	" " .	R.
N. M. Rego	" " ...	R.
Ram Chunder Krishna	" " ...	R.
Sheo Baksh	" " ...	R.
Suraj Rai Karina Shankar	" " ...	R.
Alamdar Husain	" " ...	F.
Rama Nand	" " ...	F.
Harnam Singh	28th March " ...	F.
Palekandia Atchiah . . .	9th July " ...	R.
Bhaskar Rao	" " ...	R.
Beli Ram	" " ...	R.
Choga Lal	" " ...	R.
Mangal Sain	" " ...	R.
A. Fggia Sastri	" " ...	R.
S. Fggia Narayana Shastri	" " ...	F. R.
M. L. Narayana Shastri	" " ...	R.
Jodh Singh	" " ...	F.
Badri Dutt	15th Dec. " ...	F.
Gajadhar	" " ...	F.
Hans Raj	" " ...	F.
Jagbandan Singh	" " ...	F.
Madho Ram	" " ...	F.
Manohar Singh	" " ...	F.
Natha Singh	" " ...	F.
Randaman Singh	" " ...	F.
Sheikh Chand	" " ...	F.
Jot Ram	" " ...	F.
Pirbhú Lal	" " ...	F.
A. N. Hanumantha Rao	19th March 1888 ...	R.
Madho Pershad	" " ...	R.

Imperial Forest School—(*continued*).

Where employed on 1st January 1893.	Rank on 1st January 1893.
Bengal...	Forest Ranger.
N.-W. P. and Oudh ...	" "
" "	Forester.
" "	Forest Ranger.
" "	" "
" "	" "
" "	Forester.
Burma..	Extra Assistant Conservator.
Mysore State	Assistant Conservator.
"	" "
"	
Madras...	Forest Ranger.
"	" "
Panjáb...	Extra Assistant Conservator.
Madras...	" " "
Nepal	
Baluchistan	Forest Ranger.
Madras	" "
N.-W. P. and Oudh ...	" "
Madras	" "
Central Provinces	Extra Assistant Conservator.
Jeypore State	
Baroda State	
...	(Resigned).
Patiala State	
Panjáb...	Forest Ranger.
Coorg	" "
Panjáb	" "
Central Provinces	" "
Panjáb...	" "
Madras...	" "
"	" "
"	" "
N.-W. P. and Oudh ...	Forester.
" " ...	"
" " ...	"
...	(Deceased).
Rewa State	
N.-W. P. and Oudh ...	Forester.
" " ...	"
Panjáb...	Forest Ranger.
Rewa State	
...	(Deceased).
N.-W. P. and Oudh ...	Forester.
" " ...	Forest Ranger.
Madras...	" "
N.-W. P. and Oudh ...	" "

List of Passed Students of the

Name.	Date of Certificate.	Character of Certificate.
T. Malaya Pillai	19th March 1888 ...	R.
J. G. F. Marshall	" " ...	R.
N. Nagarazú	" " ...	R.
Pandurang Narayon	" " ...	R.
Ram Narayan	" " ...	R.
A. F. X. Saldanha	" " ...	R.
Saradindú Goswami	" " ...	R.
G. H. Wittenbaker	23rd March " ...	F.
Nikunji Bihari Nandi	" " ...	F.
Rastumji	" " ...	F.
Chajjú Ram	14th July " ...	R.
Imam-ud-din	" " ...	R.
E E. Slano	" " ...	R.
Surappa Iyer	" " ...	R.
J Tapp	" " ...	F.
Radha Kishen	28th Dec. " ...	F.
V. Alwar Chetty, B.A.	25th March 1889 ...	R.*
Achru Ram	" " ...	R.
D. L K. Calderwood	" " ...	R.
S. Eggia Narayana Shastri	" " ...	R.
T. N. Hearsey	" " ...	R.
J. J. Hobday, B.A....	" " ...	R.
Jagat Ram	" " ...	R.
Kamr-ud-din	" " ...	R.
E. C M Mascarenhas	" " ...	R.
W. R. McCay	" " ...	R.
Nand Lal	" " ...	R.
Nava Kumar Seth	" " ...	R.
R. Quinnell	" " ...	R.
Raghubans Sahaya , ...	" " ...	R.
J. W. Ryan	" " ...	R.
C. Subramania Aiyar . .	" " ...	R.
Akbar Ali	" " ...	F.
Arjún Singh	" " ...	F.
Jodh Singh	" " ...	F.
Kundan Lal	" " ...	F.
Mukat Bihari Lal	" " ...	F.
E. J. N James	7th July " ...	R.
Brindaban Chandra Ghosal	" " ...	R.
Parshadi Lal	" " ...	R.
E. L Haslett	" " ...	R.
Kampta Parshad	" " ...	R.
Arokiasawmy Pillai	" " ...	R.
L Hanumanthulu...	" " ...	R.
P. R Rathnasawmy Pillai	" " ...	R.
C. H Haldane	" " ...	R.
M Rama Rao	March 1890 ...	R.*
S. G Paranjpe, B.A.	" " ...	R.*
Gulab Rai	" " ...	R.
Krishna Nand Joshi	" " ...	R.

Imperial Forest School—(*continued*).

Where employed on 1st January 1893.	Rank on 1st January 1893.
Madras	Forest Ranger.
"	Extra Assistant Conservator.
"	Forest Ranger.
Berar	" "
N.-W. P. and Oudh	" "
Madras	" "
..	
...	(Dismissed)
...	(Deceased.)
...	...
Panjáb	Forest Ranger.
"	" "
Bengal	Extra Assistant Conservator.
Madras	Forest Ranger.
Jeypore State	
Madras	Extra Assistant Conservator.
Patiala State	
Burma	Extra Assistant Conservator.
Madras	Forest Ranger.
"	Extra Assistant Conservator.
Central Provinces	" "
Panjáb	Forest Ranger.
...	(Deceased.)
Madras	Forest Ranger.
"	" "
Panjáb	" "
...	(Deceased)
Bengal	Extra Assistant Conservator.
N.-W. P. and Oudh	Forest Ranger.
Madras	" "
"	" "
N.-W. P and Oudh	Forester.
Central Provinces	"
N.-W. P and Oudh	"
Central Provinces	Forest Ranger.
"	Forester.
Bengal	Extra Assistant Conservator.
...	(Deceased)
N.-W. P. and Oudh	Forest Ranger.
" "	Extra Assistant Conservator.
" "	Forest Ranger.
Madras	" "
"	Forester.
"	Forest Ranger.
Berar	Extra Assistant Conservator.
Madras	Forest Ranger.
Central Provinces	Extra Assistant Conservator.
N.-W. P. and Oudh	Forest Ranger.
...	(Resigned.)

List of Passed Students of the

Name.	Date of Certificate.	Character of Certificate.
Nawazish Ali	March 1890 ...	R.
G W Thompson	" " ...	R.
Faiz Bakhsh	" " ...	R.
Nilkantha Mukherji	" " ...	R.
K. Rama Rao	" " ...	R.
A Tatham	" " ...	R.
Aruri Ram	" " ...	R
Prithvi Singh	" " ...	F *
Telu Ram	" " ...	F.
Ghulam Haidar	" " ...	F
E B. Powell	14th July " ..	R.
Ram Chand	" " ...	F.
W. A Hearsey	4th Dec " ...	R
Upendra Nath Kanjilal	1st April 1891 ...	R *
B Heera Singh, B A.	" " ..	R *
C. Appaya, B A.	" " ...	R *
A R Rama Rao	" " ...	R
V. Kalyanarama Aiyar	" " ...	R.
M G Rama Rao, B A.	" " ...	R
N C McLeod	" " ...	R
R F Lowis	" " ...	R.
H Srinivása Rao	" " ...	R.
M Srinivása Rao	" " ...	R.
Srinivasalu Naidu	" " ...	R.
Punnoswami Mudaliar	" " ...	R.
A. T. C Howell	" " ...	R.
Mehar Chand	" " ...	R
F Ryan	" " ...	R.
W. G. Gilmore	" " ...	R
Anantarama Iyengar	" " ...	R.
Iumati Shama Rao	" " ...	R.
J P. Haslett	" " ...	R.
Jiwa Ram	" " ...	R.
Guru Das Chatterji	" " ...	R.
Narasinha Murti Rao	" " ...	R.
A. Hunt	" " ...	R.
W Ferguson	" " ...	R.
Bhaya Lal Dube	" " ...	F.*
Jagan Nath	" " ...	F.
Jehangiri Lal	" " ...	F.
Dhondo Narayan	" " ...	F.
Pyare Lal	" " ...	F.
Ram Prasada Tiwari	" " ..	F.
Nand Lal	" " ...	F.
Narayan Chandra Datt	" " ...	F.
Ajodhya Prasada	7th Oct. " ...	F.
D. Barrow	15th " " ...	F.
Rajendra Lal Shawe	22nd " " ...	F.

Imperial Forest School—(*continued*).

Where employed on 1st January 1893.	Rank on 1st January 1893.
Panjáb	Forest Ranger.
Madras	" "
Central Provinces	" "
Assam	" "
Madras	" "
Ceylon	Forester.
Panjáb	Forest Ranger.
Nahan State	" "
Burma	Extra Assistant Conservator.
Ulwar State	Forester.
Burma	Extra Assistant Conservator.
Assam	Forest Ranger. Instructor, Forest School.
Mysore State	" Probationer.
"	" "
Madras	" Ranger.
"	" "
Mysore State	" Probationer.
Central Provinces	Extra Assistant Conservator.
Burma	" "
Mysore State	Forest Ranger.
"	" "
Berar	Extra Assistant Conservator.
Central Provinces	Forest Ranger.
"	" "
Panjáb	Forester.
Burma	Proby. Extra Assistant Conservator.
Central Provinces	Forest Ranger.
Mysore State	" "
Central Provinces	" "
"	" "
Jubal State	
Bengal	" "
Mysore State	" "
Central Provinces	" "
Ceylon	Forester.
Central Provinces	Forest Ranger.
Marwar State	" "
Kotaha State	
Central Provinces	Forester.
Kalsia State	
... ...	(Deceased).
Nalagarh State	
Central Provinces	Forestor.
Ulwar State	"
N. W. P. and Oudh	"
Central Provinces	"

List of Passed Students of the

Name.	Date of Certificate.	Character of Certificate.
Amrita Lal Chatterjee	1st April 1892 ...	R.
Ganga Prasad Khattri	" " ...	R.
R. C. Thompson	" " ...	R.
P. W. Healy	" " ...	R.
C. W. B. Anderson	" " ...	R.
G. V. Sarangpani	" " ...	R.
K. Aswathama Naidu	" " ...	R.
L. K. Martin	" " ...	R.
Moung Charlie	" " ...	R
Karam Chand	" " ...	R.
Mehdi Hasan	" " ...	R.
F. A. Seager	" " ...	R.
Krishnama Achari	" " ...	R.
M. Kavanagh	" " ...	R.
Devi Dayal	" " ...	R.
A. H. Mee	" " ...	R.
F. W. Wightman	" " ...	R.
S. R. Parsons	" " ...	R.
A. M. Walker	" " ...	R.
W. H. Blacker	" " ...	R.
R. S. Bower, B.A.	" " ...	F.
Bhairon Prasada	" " ...	F.
Daulat Ram	" " ...	F.
Jaimal Singh	" " ...	F.
Uttam Singh	" " ...	F.
Nathu Singh	" " ...	F.
Hafiz-ullah Khan	" " ...	F.

Imperial Forest School—(*concluded*).

Where employed on 1st January 1893.	Rank on 1st January 1893.
Central Provinces	Forest Ranger.
" "	" "
" "	Extra Assistant Conservator.
Burma	" "
"	" "
Baroda State	
Madras	Forest Ranger.
Berar	Extra Assistant Conservator.
Burma	Forest Ranger.
Panjáb	Forester.
N. W. P. and Oudh	Forest Ranger.
Coorg	Extra Assistant Conservator.
Madras	Forester.
Burma	Extra Assistant Conservator.
Panjáb	Forester.
Bengal	Extra Assistant Conservator.
Central Provinces	Forest Ranger.
" "	" "
Ceylon	Forester.
Madras	Forest Ranger.
"	" "
Central Provinces	Forester.
Jodhpur	
N.-W. P. and Oudh	"
" "	"
" "	"
" "	"

List of Directors of the Imperial Forest School since its institution.

Name—	From—	To—
Capt (then Major) F. Bailey, R.E. ..	Sep. 1, 1878	Oct. 31, 1881
Major G. J. VanSomeren (Offg.) ...	Nov. 1, 1881	May 10, 1882
Major F. Bailey, R E.	May 11, 1882	Feb. 21, 1884
W. R. Fisher, Esq. (Offg)	Feb. 22, 1884	Dec. 15, 1884
E E Fernandez, Esq. (Offg)	Dec. 16. 1884	Mar. 15, 1885
W. R Fisher, Esq (Offg)	Mar. 16, 1885	Jan. 1, 1889
E E. Fernandez, Esq (Offg.)	Jan. 2, 1889	Jan. 15, 1889
Lieut -Colonel F Bailey, R.E.	Jan. 16, 1889	June 10, 1889
E E. Fernandez, Esq. (Offg)	June 11, 1889	Aug. 22, 1889
Lieut.-Colonel F. Bailey, R E.	Aug. 23, 1889	
Colonel G J. VanSomeren (Offg) ...	Aug. 24, 1889	Nov. 23, 1889
Lieut -Colonel F. Bailey, R E.	Nov. 24, 1889	Mar. 23, 1890
C Bagshawe, Esq.	Mar. 24, 1890	Oct. 13, 1890
J. S. Gamble, Esq.	Oct. 14, 1890	

PROGRAMME OF HILL TOUR OF 1892.

The Class of 1891-93 will move from Karwapani to Dehra in time to be present at the prize distribution on or about April 1st.

From April 1st to April 8th they will get ready for tour in the hills and do some practical work in the School and Kaunli gardens. This year they will not march regularly to Chakráta, but may proceed in such way as they prefer. Roll will be called at the Divisional Forest Office at Morrow's Neck, Chakráta, at 8 A. M. on Monday, April 11th, and thereafter the following will be done:—

April	11.	Visit to the Fuel sheds and Timber depôt at Chakráta. Lecture on the forests and forest-trees of the Division and the plans made for its working.
„	12.	Visit to the Lurli Forest.
„	13.	„ „ Suitoli „ and Forest Garden.
„	14.	March to Jadi *viâ* Matkangra Block.
„	15.	Jadi to Bodyar.
„	16.	Deodár reproduction at Bodyar, natural and artificial.
„	17.	Sunday.
„	18, 19.	At Bodyar. Practical work and visits to important localities.
„	20.	March to Kotikanasar.
„	21, 22, 23.	At Kotikanasar. Practical work in thinning out kail over deodár, &c.
„	24.	Sunday.
„	25.	March to Deoban visiting Kanjatra.
„	26 to 30.	At Deoban to study the reproduction of the Kharshu oak and the firs and to do practical work. Also monthly examinations, 29th and 30th.
May	1.	Sunday.
„	6 to 7.	At Mundali to study the planting works, the cutting out of inferior trees and the measurements of height, &c., of trees.
„	8.	Sunday.

May	9.	March to Kathyan.
„	10 to 14.	At Kathyan. Visits to the resin tapping works, road making, thinning of blue pine over deodár and other general practical forest works.
„	15.	Sunday.
„	16.	March to Thadyar.
„	17.	At Thadyar. Reproduction and management of Chír forests. Timber sledge road and sleeper shoot.
„	18.	March to Deota.
„	19, 20, 21.	At Deota. Exploitation of deodár forests. Cutting and extraction of sleepers. Old sledge road.
„	22.	Sunday.
„	23.	March to Thadyar.
„	24.	March to Kathyan.
„	25, 26, 27.	Monthly examinations and practical work.
„	28.	March to Mundali.
„	29.	Sunday.
„	30.	March to Deoban.
„	31.	March to Chakráta and break off for the Vacation.

1. This order may be slightly altered perhaps, but will be adhered to as nearly as possible. Students should have their letters addressed "Forest School Camp *viá* Chakráta."

2. As far as Chakráta, students will make their own arrangements for carriage. Beyond Chakrata, the carriage employed will be either mules or coolies. As carriage in the hills is both expensive and limited in quantity, each student will leave Dehra with no more equipment or luggage than is absolutely necessary, but he should take care that he has sufficient warm clothing and bedding. As few servants as possible should be taken, and their number reported to the Deputy Director before starting. Should any student desire to do so, he can leave anything that, after starting, he may find to be unnecessary, at the forest Chauki at Chakrata in charge of the Depôt Munshi. The student will write out a list in duplicate, of all such articles, sign both and obtain the signature of the Munshi to both. The student and the Munshi will each retain one copy of the list as a voucher.

3. Unless the Deputy Director in charge should otherwise arrange, coolies will be paid by the student employing them at the end of each day's march. To prevent mistakes, each cooly, before taking up his load, will be given as a voucher, a slip of paper bearing on its face the date of the march and the name of the owner of the load; and each voucher must be redeemed by payment in full daily.

4. When mules are employed, each mule owner will be given slips showing the date of the march and the name of the owner or owners of the load. These vouchers must be redeemed at times fixed by the officer in charge of the Camp. Students are not allowed to choose their coolies or mules, but must take those apportioned to them by the Forest Ranger or by their Instructors.

5. No student will be allowed to take any horse or pony beyond Chakráta. Dogs may not be taken at all.

6. As the close season for game-birds will be on when the camp is in the hills, no shooting of such birds may be allowed. Shooting of other game will only be allowed by special permission of the Deputy Director on holidays.

7. No student is to run into debt with villagers anywhere. Payment in full must be made daily for articles bought from Forest subordinates or from the Forest Department banias. Students are personally responsible for their servants' debts.

8. The orders of the Deputy Director and Instructor in charge of the Camp must be strictly attended to in all particulars, including sanitary regulations, laying out of the camp, discipline, leave of absence, &c., &c.

9. At 10-30 P.M. all lights (excepting mere night lights) must be put out, unless specially sanctioned, on each occasion, by the officer in charge. After 10-30 P.M. silence must be kept in camp.

10. The following bugle calls will be sounded in camp. The hours will be fixed by the officer in charge from time to time :—

(1) First bugle;

(2) Warning bugle, half an hour before class or excursion;

(3) Fall in bugle;

(4) Break off bugle.

11. No camp will be moved on Sundays, except for very special reasons, and no student will be required to do any work on a Sunday. On Sunday, for Protestant Christian students, Divine Service will be held as usual should any be present. A quarter of an hour before the time fixed on, the bugle will sound.

12. Each student will provide himself with—

1. Measuring tape if he has one.
2. 2 foot rule.
3. A pair of plant collecting boards, drying paper and newspaper to pack specimens in.
4. Handsaw.
5. Pruning knife.

He is recommended to carry a sling bag with the necessary articles and his note books.

13. Before starting from Dehra, the Deputy Director will inspect note books, collecting boards, &c., in order to see that the students are fully and properly provided.

DEHRA DÚN:
1st *March* 1892.

PROGRAMME OF TOUR FOR THE SENIOR CLASSES.

November to March 1892-93.

Senior students—both classes in charge of Deputy Director.

November 1. March to Lachiwála and remain there till the 20th December. In the mornings from 7-30 to 9 A.M., there will be lectures or private study, as the Deputy Director may order. At 11 A.M. the students will be employed in out-of-door practical work, the details of which will be notified to them from time to time by the Deputy Director.

I. The principal work will be to prepare a working plan for the Lachiwála Coppice, the chief items in this operation consisting of:

1. Making enumeration surveys to ascertain the stock.
2. Selecting and marking the standards.
3. Description of compartments.
4. Actually felling a portion of the current year's coupe.

Besides this, other work at Lachiwála will embrace :—

II. Charcoal burning.

III. All work connected with improvement fellings in the Sál forest.

IV. Planting out Chír pine and other trees in baskets.

V. Sowing in all its branches.

VI. Preparation of various fibres.

&c. &c. &c.

These works will occupy the students till the 21st December, when the Christmas holidays will commence.

January 5. Reach Lahore.

" 6. Roll call at 8 A.M. at Conservator's office. Visit Shadera plantation in afternoon, assembling at the point fixed at 11 A.M.

" 7. Shadera plantation, assemble at 11 A.M.

" 8. Sunday.

" 9. Lahore to Changa Manga. (European students will go to the Sarai; others will camp near the Forest House.)

" 10—14. At Changa Manga. Study the plantation, working-plan, tramway, outside rakhs, &c.

" 15. Sunday.

" 16. Leave Changa Manga at 1 P.M. (Bombay mail).

" 18. Arrive Ajmere 3 A.M.

" 19, 20, 21. See Ajmere forests.

" 22. Sunday.

" 23. Leave Ajmere at 1-17 A.M.

" Arrive Saháranpur at 7-45 P.M.

" 24. Visit Saháranpur Botanic Gardens.

" 25. Arrive Hardwár 4-44 P.M.

" 26. Halt at Hardwár. Visit Ránipur Coppice and Bamboo plantation.

" 27. Hardwár to Parduni. Visit Ganges Canal Head works on the way.

January	28. Bamboo thinnings and plantation.
„	29. Sunday.
„	30. Parduni to Kansrao. See evergreen forest on the way.
„	31. Kansrao to Lachiwála. See Sissoo forest and reproduction on the way.
February	1. Lachiwála to Thano. See Sample plot on the way.
„	2. Give out Surveying instruments and allot areas.
„	3 To 9th March. Survey examination and revision of work in preparation for final examinations.
March	10. Thano to Dehra.
„	11. Sunday.
„	12. Examinations commence.

General Rules for conduct in Camp.

1. While on the march from Hardwár to Thano, camels will be employed for carriage, as carts cannot be obtained. The Officer in charge of the Camp will issue the subsidiary orders regarding division of cost of carriage, dates of payment of hire, &c., &c. Students must find their own way to Lahore, and be there by the date fixed.

2. Students may take their horses with them, but they are not to be used on excursions or when under instruction. Dogs may not be taken into camp except with the special permission of the Deputy Director. Shooting and fishing are prohibited except on holidays and then only with the previous permission of the Deputy Director or Instructor in charge.

3. The orders of the Deputy Director or Instructor in charge of the camp must be strictly attended to in all particulars, including sanitary regulations, laying out of the camp, discipline, leave of absence, &c., &c.

4. When two or more camps meet, the senior officer of the School present will assume entire charge of the whole party of students and officers.

5. Latrines will be erected for use by the s tudents who are expected to use them *only*. Any cases in which neglect of this rule is brought to the notice of the Officer in charge will be severely punished.

6. At 10-30 P.M. all lights must be put out, unless the officer in charge specially sanctions their retention. After 10-30 P.M. silence must be kept in camp. Students are responsible for their servants, &c.

7. The following bugle calls will ordinarily be sounded in camp. The hours will be fixed by the Officer in charge according to season and locality :—

(1) Reveillé.

For class.

(2) Warning bugle half an hour before class.

(3) Class bugle.

(4) Break off bugle.

For excursion or out-of-door work.

(5) Warning bugle half an hour before.

(6) Fall in bugle.

8. No camp will ordinarily be moved on Sundays. On Sunday Divine Service will be held by the Officer in charge. A quarter of an hour before the time fixed on, the bugle will sound.

DEHRA DÚN:
12*th October* 1892.

PROGRAMME OF TOUR FOR THE JUNIOR CLASSES.

Winter Term, 1892-93.

November 1. March to Karwapani.

" 2. " Kallianpur.

" 3 to December 21st. At Kallianpur. The students will employ their time chiefly in practical Surveying. In the mornings there will be lectures on Sylviculture, illustrated, when necessary, in excursions to the neighbouring forest.

December 22 to *January* 4, 1893. } Christmas Holidays.

January 5. Dehra Dún.

" 6. Roll call at Sahanspur.

" 7. March to Dakhpathar.

" 8. Sunday. Halt.

" 9. Inspection of Boom and Timber depôt at Dakhpathar.

" 10. Visit to the Kálsi coppice near Dakhpathar.

" 11. March to Dharmawála.

" 12. Visit to the Shahpur and Badripur forest blocks.

January 13. March to Badshaibágh.
„ 14. Visit Badshaibágh coppice areas.
„ 15. Sunday. Halt.
„ 16. March to Barkala.
„ 17. „ Kasumri through the forest by Barkala and Kasumri Raus.
„ 18. „ Shábjahánpur.
„ 19. „ Mohand.
„ 20. Visit Mohand coppice areas.
„ 21. March to Dholkhand.
„ 22. Sunday. Halt.
„ 23. Visit sample plots, improvement felling areas, &c.
„ 24. March to Beribara.
„ 25. Visit Beribara coppice.
„ 26. March to Ránipur.
„ 27 to 6*th February*. Practical work at Ránipur, coppicing, bamboo thinnings, &c., &c., and examinations.
February 7. March to Parduni.
„ 8. At Parduni: bamboo works.
„ 9. „ Nichla Suswa coppice and other works.
„ 11. March to Kansrau.
„ 12. Sunday. Halt.
„ 13. March to Bulawala.
„ 14. „ Phandowala.
„ 15. Visit various works in forests near Phandowala.
„ 16. March to Asarori: see Rámgarh plantation.
„ 17. „ Karwapani.
„ 18 to 31*st March*. At Karwapani. Practical instruction in Forest Engineering and Forestry.
April 1. March to Dehra.

General Rules for conduct in Camp.

1. While on the march from Dehra through the Dún and Saháranpur Divisions to Ránipur and again thence to Karwapani, camels will be employed for carriage, as carts cannot always travel. The Officer in charge of the Camp will issue the subsidiary orders regarding division of cost of carriage, dates of payment of hire, &c., &c.

2. Students may take their horses with them, but they are not to be used on excursions or when under instruction. Dogs may not be taken into camp except with the special permission of the Senior Instructor. Shooting and fishing are prohibited except on holidays and then only with the previous permission of the Instructor in charge.

3. The orders of the Instructor in charge of the camp must be strictly attended to in all particulars, including sanitary regulations, laying out of the camp, discipline, leave of absence, &c., &c.

4. When two or more camps meet, the senior officer of the School present will assume entire charge of the whole party of students and officers.

5. Latrines will be erected for use by the students who are expected to use them *only*. Any cases in which neglect of this rule is brought to the notice of the Officer in charge will be severely punished.

6. At 10-30 P. M. all lights must be put out, unless the Officer in charge specially sanctions their retention. After 10-30 P. M. silence must be kept in camp. Students are responsible for their servants, &c.

7. The following bugle calls will ordinarily be sounded in camp. The hours will be fixed by the Officer in charge according to season and locality :—

(1) Reveillé.

For class.

(2) Warning bugle half an hour before class.

(3) Class bugle.

(4) Break off bugle.

For excursion or out-of-door work.

(5) Warning bugle half an hour before.

(6) Fall in bugle.

8. No camp will ordinarily be moved on Sundays. On Sunday, Divine Service will be held by the Officer in charge. A quarter of an hour before the time fixed on, the bugle will sound.

DEHRA DÚN:
17th October 1892.

RULES FOR THE OCCUPATION OF STUDENTS' QUARTERS.

1. The Range of Quarters consists of sixteen rooms, each of which is intended for the accommodation of two students. The rooms will usually be allotted equally to the Senior and Junior classes.

2. Quarters will be allotted at the beginning of each Rains Term by the Director. On making the allotment he will usually give precedence in order of application.

3. Forest Rangers and Foresters on the permanent staff of the Forest Department will usually be held to have prior claim to quarters.

4. The rent of each of the sixteen sets of Quarters will be Rupees 4 per mensem, *i.e.*, each student will have to pay Rs. 2 per mensem during the whole period of his occupation. This rent will be deducted monthly from his subsistence allowance.

5. No student may give up his Quarters, except on the completion of his course, without the written permission in each case of the Director; and no student may under any circumstances sub-let his Quarters or allow any one else to occupy them, for *any* length of time.

6. The cook-rooms behind the Quarters will be allotted among the occupants of the Quarters, who will be held responsible that their servants using them maintain them clean and in good order.

7. Sweepers (usually 3) will be maintained under the authority of the Director for the purpose of cleaning Quarters and cook-rooms and to assist in the latrines. Each student occupying Quarters will contribute 8 annas per mensem towards the pay of these men who will also follow the camp on tour.

8. All Quarters and cook-rooms must be kept neat and clean and well ventilated and the Director and Deputy Director will make frequent inspections to see that this rule is carried out.

9. No bedsteads, boxes or articles other than tables or chairs shall be placed in the verandah or in the spaces between rooms during the daytime, and then only temporarily, the owner being present.

10. No dogs are allowed in Quarters, or anywhere within the School precincts.

11. The tank in front of the cook-rooms is provided only for the washing of cooking pots and similar utensils and then only after such utensils have been scrubbed with sand. The water in which such utensils have been cleaned is not to be allowed to return into the tank. Bathing on the edge of the tank is strictly prohibited.

12. The washing places are not to be used for any but bathing purposes.

13. Receptacles will be provided outside the cook-rooms, into which all solid refuse must be emptied for removal by the sweeper.

14. Students are responsible for all acts committed by, and for the behaviour of, their servants.

15. Students occupying Quarters are responsible for all damage done to their Quarters and no enquiry will necessarily be made; but each student will be charged for such damage at a rate which will be fixed by the Director in each case.

16. Each student will be provided with one table and one chair and if available a bedstead. All other furniture must be provided by the student himself.

Books and Instruments required by Students.

1. Students who join the Imperial Forest School for the English class will be expected to provide themselves with the following books and Instruments at once. They can be obtained from the School Store-keeper:—

1 Todhunter's Trigonometry.
1 „ Algebra.
1 „ Mensuration.
1 Barnard Smith's Arithmetic.
1 Hamblin Smith's Statics.
1 Tables of Logarithms.
1 Roorkee Surveying Manual.
1 Fernandez's Smaller Forestry Manual (when published fully).
5 Primers of Botany, Physical Geography, Geology, Chemistry and Physics.
1 Smythies' list of Dún Trees, &c.
1 Magnifying glass.
1 Small pair botanical pincers.
1 2 feet measuring rule.
1 6 feet nickel case tape.
1 Small box mathematical instruments containing compasses, bow-pen and protractor.
1 Architects' Rule.
2 Set Squares 45° and 60°.
1 Card protractor.
1 Dozen drawing pins.
3 Brushes of sizes.
4 Pencils 1 H.H., 1H., 2 H.B.
1 Piece India rubber.
1 Piece Indian ink.
6 Drawing nibs with holder.

10 Cakes colours, green, vermillion, sienna, cobalt, gamboge, yellow ochre, carmine, Prussian blue, neutral tint, sepia.

1 Colour slab.

6 Field books (when ready).

6 Lecture and surveying note books.

A small supply of stationery including pens.

The cost of these is expected to come to about Rs. 50, which will be adjusted out of the allowance for the purpose given to each Student.

2. The Store-keeper, Babu Birbal, Forest Ranger, is prohibited from issuing any articles from store to anybody except—

(1) On payment in full;

(2) On written order of the Director.

Students requiring articles from store must therefore either pay for them in cash or obtain from the Director an order on the Store-keeper.

3. The following articles will be supplied by the School on loan, on the students' receipt, at such times as they may be required and will be returned to store when no longer required :—

For Survey work	Drawing Board. Prismatic Compass and stand. Plane-table and stand. Chain and arrows. Level and staff. Flags. Offset rods. Pentagraph. Planimeter and any others that may be required.
For forest and other work.	Diameter gauges. Tree-measurers. 1 pair plant collecting boards with sufficient paper (will usually be retained during whole term of studies).

4. Books of reference may be consulted in the Library or Herbarium, but will not be permitted on any account to be removed from those rooms. The following books will be lent when required :—

Forest Department Codes.

Forest Acts and other Acts required for the Law Course.

5. All articles lent to students must be signed for previous to issue, and the student will be responsible for loss or damage to

them, the amount payable for such loss or damage to be assessed by the Director or some School Officer authorized by him.

6. The apparatus, specimens, maps, &c., used in lecture or placed in the Museum are the property of the Government and must on no account be removed from the School premises. Any infraction of this order will be most severely punished.

ENTRANCE EXAMINATION, 1892.

I.—English.

(*Time allowed* 3 *hours.*)

A.—Composition.

1.—Put into plain simple prose the following :—

(1) Then springs to view, blood-red and fierce of hue
As blooms sprung new on the Kusumbha tree
The wood-fire's tongue, fanned by the winds, and flung
Furiously forth——thorns, canes and brakes you see
Wrapped in one agony.

(2) Far in the mirror, bright and blue
Each hill's huge outline you may view
Shaggy with heath, but lonely bare,
Nor tree, nor bush, nor brake, is there,
Save where, of land, yon slender line
Bears thwart the lake the scattered pine.

2.—Give the plural of the following words :—Child, brother, food, index, sheep, loaf; and the past tense of make, lay, lose, think, light, shut, go.

3.—Write a short essay on one of the following subjects :—

(1) The advantage of a settled career.
(2) Indian fruits and fruit growing.
(3) An account of some fairly long journey you have undertaken either for business or pleasure.

[*Note.—Correct language, expression, and spelling are of more importance than mere length of writing.*]

B.—Conversation.

The candidate must, in a conversation, extending over at least a quarter of an hour, satisfy the officer conducting the examination that he possesses a fluent and accurate colloquial knowledge of English. In order further to test his ability to understand spoken English, he will be required to write in his own words, in his vernacular (Hindustani, Bengali, Tamil, English, &c., as the case may be) the substance of a communication made to him verbally in English, such as an order to a Forest Subordinate. (A certificate to the effect that the candidate has satisfied both these tests must accompany his written answers to the previous questions.)

II.—Arithmetic.

(*Time allowed* $2\frac{1}{2}$ *hours.*)

1. Simplify $\dfrac{13}{2\frac{2}{3}+\frac{1}{4}} + \dfrac{1\frac{1}{8}}{3\frac{1}{2}} - 1\frac{3}{10}$; and find the value of $\dfrac{2\frac{1}{11}+\frac{80}{11}}{\frac{3}{88}}$ of £5 6*s.* 8*d.*

2. Divide 213·419596 by 1·00103 and by 10010300; and find the value of $3{\cdot}2\dot{3} \times 1{\cdot}0\dot{1} \times 10\,8\dot{1}$ correct to 6 decimal places.

3. An article marked Rs. 43-12-0 for credit is sold at Rs. 36-4-0 for cash; what is the discount per cent.?

4. Five years ago a municipality borrowed a sum of Rs. 8,000 at 7 per cent simple interest. They agreed to pay off Rs. 800 of the principal at the end of each year, besides the interest due. What will be the amount of their next, or sixth, payment?

5. An investor, who had 100 hundred rupee shares in a Bank sold out at $109\frac{1}{2}$, and invested the proceeds in Government paper yielding 4 per cent. at $103\frac{1}{4}$. If the Bank paid him a 9 per cent. dividend regularly, what will be the difference in his income?

6. Two clock hands turn on the same centre; one hand revolves in 15 hours, and the other in 21 hours. In what time will one hand have gained a complete revolution on the other?

7. Find the G. C. M. of 2130, 960, and 710; and L. C. M. of 18, 42, and 90.

III.—Algebra.

(*Time allowed* $2\frac{1}{2}$ *hours.*)

1. Add together $ax - by$, $x + y$, and $(a - 1)x - (b + 1)y$; and from $2(a + b) - 3(c - d)$ take $a + b - 4(c - d)$.

2. Reduce to its simplest form the difference between the expressions—

$$x^3 - y^3 + 6\{x^2y - (xy^2 + 3xy)\} - 14\{8(x^2 - y^2) - 12(2x - 3y + 1)\}$$
and $$y^3 - x^3 - 3\{2xy(y - x) + 6xy\} - 56\{2y^2 - 2x^2 + 9y - 6x - 3\}$$
and find its value when $x = 1$, $y = 2$.

3. Extract the square root of $x^8 - 4ax^5 + 14a^2x^4 - 22a^3x^3 + 29a^4x^2 - 10a^5x + a^6$.

4. Solve the following equations—

$$(1)\quad \frac{1}{x-2} - \frac{1}{x-4} = \frac{1}{x-6} - \frac{1}{x-8}$$

$$(2)\quad x + \sqrt{x+2} = \frac{7}{4}$$

$$(3)\quad \frac{x}{5} + \frac{5}{x} = 5\frac{1}{5}$$

$$(4)\quad x^2(x-y) = 25$$
$$x^2(2x+3y) = 550.$$

5. A tank can be filled by a supply pipe in 4 hours, and can be emptied by an exhaust pipe in 6 hours. When both are opened simultaneously, a leak springs out which would empty the full tank in 5 days. How soon will the tank be full?

6. A person bought a certain number of mangoes, half of them at 3 pie each, and half of them at three for an anna. He sold them again at the rate of 5 for 2 annas, and made Rs3 annas by the bargain. How many mangoes did he buy?

IV.—Geometry.

(*Time allowed* 2½ *hours.*)

1. What is Geometry? Define a straight line, a plane superficies, a circle, a rhombus, and similar rectilineal figures.

2. If one side of a triangle be produced, the exterior angle will be greater than either of the interior and opposite angles.

3. If a straight line be divided into two parts, the square on the whole line is equal to the sum of the squares on each part together with twice the rectangle contained by those parts.

4. The angle at the centre of a circle is double of the angle at the circumference on the same base, that is on the same arc.

5. If the straight line bisecting the exterior angle of a triangle be parallel to the base, show that the triangle is isosceles.

6. Two triangles of equal area stand on the same base and on opposite sides. Show that the straight line joining their vertices is bisected by the base, or base produced.

7. The sides about the equal angles of triangles which are equiangular to one another are proportionals; and those which are opposite to the equal angles are homologous sides, that is, are the antecedents or the consequents of the ratios.

V.—Mensuration.

(*Time allowed* 2½ *hours.*)

1. What is the difference between 16 square feet and 16 feet square? How many slates 9 inches wide and 15 inches long are required to cover an area of 16 square feet? and how many yards of carpet 30 inches wide are required to cover an area of 16 feet square?

2. Define a parallelepiped, a right circular cylinder, and a sphere. A well has an interior diameter of six feet, the depth is 150 feet, and the wall is two feet thick. Find the cost of the masonry at Rs. 20 per 100 cubic feet.

3. Calculate the cubic contents of a sál log which tapers uniformly from 54 inches girth at the large end to 36 inches at the small end, and is 28 feet long ($\pi = \frac{22}{7}$).

4. The perimeter of one square is 748 inches, and that of another is 336 inches. Find the perimeter of a square which is equal in area to the other two.

5. A box with a lid is made of planks ½ inch thick, and the outside measurements are 28 inches long, 16 inches wide and 13 inches high. What will the empty box weigh, if the wood weighs 45lbs. a cubic foot?

6. If gold can be beaten so thin that a grain will form a leaf of 56 square inches, find how many of these leaves will make an inch thick, the weight of a cubic foot of gold being 10 cwt. 95lbs.

7. If a square and a rectangle have equal perimeters, prove that the area of the square is greater than the area of the rectangle; and if a circle and square have equal perimeters, prove that the area of the circle is greater than the area of the square.

FINAL EXAMINATIONS, MARCH 1892.

Upper Class.

Forestry. (Mr. A. Smythies.)

Paper No. I. SYLVICULTURE.

1. Define the following terms :—*Deciduous, leaf-canopy, pure forest, principal species, dormant bud, clear fell, climber, bole, pollard.*

2. Distinguish between gregarious and non-gregarious species, give instances of each, and account briefly for the gregariousness of any one of the former kind you may have mentioned.

3. Describe the circumstances which favour a species in the struggle against fire, illustrating your remarks by reference to one or more of the following species :—*Sál, Chír pine, Sissoo, Kikar (babúl), Silver fir.*

4. Describe briefly how seedlings are raised in nurseries.

5. Describe one or other of the following methods :—(1) Complete sowing with cultivation. (2) Sowing in patches. (3) Planting in pits. (4) Planting in pots or baskets.

6. Describe the selection method, and show how you would apply it to a mixed hill forest in which Deodár is the principal species.

7. Describe the treatment of a forest by the method of coppice with standards.

8. Distinguish between cleanings and thinnings and show in what state of the crop each operation may become necessary, illustrating your remarks by any facts you may have personally observed during your tours in the School Circle forests.

9. What are improvement fellings? Explain why it has been considered advisable to apply them in the Sál forests of Dehra Dún.

10. Describe briefly the preparation of a fire trace.

Forestry. (Mr. A. Smythies.)

Paper No. II. UTILIZATION AND WORKING-PLANS.

1. What do you know about weight as a technical property of wood? Mention some of the heaviest and some of the lightest woods in India.

2. Mention the principal defects in wood; and describe the effects of a broken branch in producing unsoundness.

3. What are the qualities of wood required for (1) cabinet making, (2) railway sleepers, (3) construction? Mention the principal Indian woods used in these industries.

4. Describe the different kinds of axe required for (1) felling, (2) trimming, (3) coppicing.

5. Describe the license or permit system of disposal of forest produce. Under what circumstances can the ticket system, as applied in the Dehra Dún Division, be adopted?

6. Describe the tapping of *Pinus longifolia* for resin.

7. What is the meaning of the term working-plan? and why are working-plans required? Define exploitable age, working-circle, method of treatment, rotation.

8. Compare the State as an owner of forest with the Private Individual, and discuss the age of felling suitable to State forests in India.

9. How is a valuation made by means of linear survey? how is it conducted? and how do you determine the volume of the standing crop from the data thus obtained?

10. Enumerate the principal points to be attended to in a working-plan for a simple coppice.

Drawing, Surveying, and Estimating. (Mr. C. G. Rogers.)

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1. What is a scale? How does the scale to which a survey is to be plotted affect the details of the offsets taken? Construct a scale of $\frac{1}{120}$ to read feet and diagonally inches, mark on the scale a distance of 43 feet 6 inches.

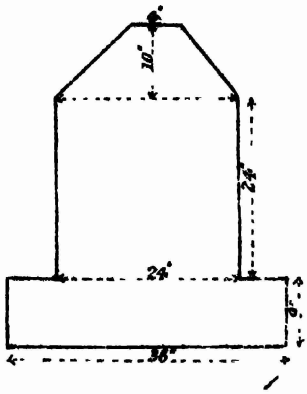
2. Describe briefly the chief methods of reducing and enlarging maps.

3. Describe fully, in order, the temporary adjustments of the Dumpy level. What is a datum line? What is a contour line?

4. Examine the map placed before you. Which is the higher of the two points A and B and by how much? Join AB and make a section showing the configuration of the ground along the line AB.

5. The figure represents a vertical section of a masonry boundary pillar whose base is square. Draw a plan of the pillar and find out its cubic contents, also the amount of lime necessary to construct 100 such boundary pillars, given that a cubic foot of masonry requires $\frac{1}{4}$ of a cubic foot of mortar and that the mortar consists of two

parts of sand to one part of lime (by volume) and that a cubic foot of lime weighs 27 lbs. The boundary pillar is in shape a rectangular prism with a square base, the top being a truncated pyramid on a square base.



Forest Engineering. (Mr. C. G. Rogers.)

1. What is lime? What are the chief sources of lime in India? Describe the ordinary method of burning lime employed in the Dún.

2. What is understood by seasoning as applied to timber? How would you proceed to season a log of Teak, or Sál, or Deodar?

3. What is the 'bond' of a wall? Illustrate your answer by sketches.

4. What are 'Plans' 'Specifications' and 'Estimates' as applied to buildings? How would you proceed to mark out on the ground a building of which you are given the plan?

5. Discuss briefly the chief considerations which influence the alignment of a Forest road.

6. Describe Abney's Level, illustrating your answer with sketches. Explain its use in laying out roads at given gradients.

7. What is a 'sledge road'? Describe, quite briefly, the construction and practical working of the Thadiar sledge road.

8. Describe the construction of a 'cribwork spur.' How are such spurs applied to the protection of a bridge? Where have you seen such works?

Mathematics. (Mr. A. Smythies.)

1. Find the amount of Rs. 1,000 in 5 years at 12 p. c. compound interest, due and calculated every half-year.

2. Explain how angles are measured according to the English or sexagesimal method, and find the value of $\frac{3}{8}$ths of two right angles. What do you understand by *negative* angles?

3. Define *sine, cosine,* and *cotangent;* and in any triangle, prove that the sides are proportional to the sines of the opposite angles.

4. Prove that the height of a tree is given in the expression d (tan α—tan β), where d is the horizontal projection of the distance between the observer and the foot of the tree, α, β the angles of elevation (or depression) of the top and bottom of the tree respectively. How would you adapt this expression to logarithmic calculation?

5. A base is measured on a plain to be 5 miles 1,020 yards long, and the bearings of a distant peak from the ends of the base are observed to be 75°25′ and 58°38′ respectively. Find the distance of the peak from one end only (either end) of the base.

6. Define a Lever, and show that mechanical disadvantage is always the result of a lever of the third class. Which kind of lever would you use for moving a log in the forest?

7. I wish to ascertain the depth of a well by dropping a stone into it. The interval that elapses between dropping the stone and hearing the splash in the water is $4\frac{2}{5}$ seconds. Calculate the depth of the well roughly; and show how to calculate it more accurately by taking the velocity of sound at 1,093 feet a second, and making allowance for the time occupied by the sound of the splash in reaching the ear.

8. A Fir tree is 175 ft. high and has a girth of 15 ft. at breast high; the reducing factor for that class of tree and forest is 0·53. Calculate the cost of felling, logging, and stacking at Re. 1-12-0 per 100 stacked c. ft; carriage to depôt (10 miles) at Re. 1-2-0 per 100 st. c. ft per mile, and revenue realized at Rs. 18 per 100 st. c. ft. (100 solid c. ft. = 150 stacked c. ft.).

9. The following number of rings are counted on consecutive inches along the radius from the centre outwards:—

1st tree. 8, 5, 5, 3, 3, 4, 5, 7, 5, 4, 6, 6, 14.
2nd „ 11, 15, 35, 6, 2, 6, 7, 3, 10, 3, 4, 5, 3.
3rd „ 6, 6, 6, 3, 7, 6, 6, 5, 7, 11, 15, 23, 12.

From these data, determine the average age of a tree six feet in girth.

Natural Science, No. 1. (Mr. A. F. Gradon.)

1. What is air? Give three proofs of your statement as to whether it is a mixture, or a compound, and say how its composition may be determined by means of the eudiometer.

2. How is Nitric Acid prepared from Nitre? (Give equation.) What are its chief properties? What would be the result of mixing nitric acid with an alkali such as caustic potash?

3. What is Carbon dioxide, and in what forms does it chiefly occur in nature so as to affect the growth of forest trees?

4. What is the relation between the volume of a gas and (1) the pressure, (2) the temperature to which it is subjected? If a litre of Oxygen at 0° C. and a pressure of 760 mm. of mercury weighs 1·43 grammes, what will a litre of Oxygen weigh if measured at a temperature of 15° C. and a pressure of 752 mm. of mercury?

5. What do you understand by Latent Heat of vaporization? How much steam at 100° C. is required to raise 100 lbs. of water at 0° C. to 50° C.?

6. How do you account for Tidal Currents, and how is it that the rise and fall of the tides are not the same in amount from day to day?

7. Show—giving sketches—how the formation of mountain chains can be accounted for by the cooling of the interior of the earth.

8. Give a short account of the principal river basins of India, and say into what seas these rivers respectively flow.

Natural Science, No. 2. (Mr. A. F. Gradon.)

1. State briefly what you understand by sedimentary rocks, organic rocks, igneous rocks, and metamorphic rocks, and give two common examples of each.

2. What do you understand by dip, strike, unconformable strata (giving figures), and faults?

3. What are fossils, and how may they afford a means of determining the relative ages of rocks?

4. What is the composition of quartz, mica, felspar, kaolin, and laterite?

5. State briefly what are the chief mechanical, chemical, and organic agencies to which the formation of soils is due.

6. How may the organic be separated from the inorganic part of a soil, and what are the chief insoluble constituents of the latter portion?

7. In what localities during your School tours have you seen any of the following rocks or soils :—sandstone, recent boulder deposits, limestone; and what were the physical characteristics of each?

Botany. (Mr. A. F. Gradon and Mr. J. S. Gamble.)

Paper No. I. MORPHOLOGY, CLASSIFICATION, AND GEOGRAPHY.

1. Generally speaking, how may the root of a plant be distinguished from the stem? What is a rhizome, a bulb, and a culm? Give examples of each.

2. What are the essential parts of a flower? Explain the terms Monadelphous, Syngenesious, Apocarpous; and mention any natural orders in which these characteristics occur.

3. Show, by rough sketches, the following forms of leaves: pinnate, entire, emarginate, cordate. Attach to each of the four leaves given you a label giving its description.

4. In what Forest Natural Orders are opposite leaves chiefly observed, either with or without stipules? What are stipules?

5. What are the leading characteristics of outward appearance and structure by which you would distinguish Dicotyledonous from Monocotyledonous plants?

6. Give the characters of the Dipterocarpeæ and the Coniferæ and state in what principal divisions they respectively come.

7. In what way are the Fungi important in Forest economy?

8. Give the distribution of the Evergreen and Deciduous Forests of India, mentioning a few species characteristic of either class.

Botany. (Mr. A. F. Gradon and Mr. J. S. Gamble.)

Paper No. II. ANATOMY, PHYSIOLOGY, AND WOUNDS AND DISEASES.

1. Describe the structure of a monocotyledonous stem.

2. What is an Epidermis? Describe its structure. Also explain briefly what are Stomata, Glands, Lenticels.

3. Describe the male and female reproductive organs of phanerogamic plants. How is the fertilization of the ovule effected?

4. Is light indispensable for any of the functions of a plant? If so, for which? And what is its effect on growing parts?

5. What do you understand by 'Turgescence' and 'Tissue tensions'?

6. What is 'Assimilation'? Describe what takes place as it goes on in a leaf.

7. How may the nutrition of a flowering parasite differ from that of a Fungus?

8. Describe the healing up of a wound such as a longitudinal slit through the cortex extending down to near the cambium layer, but not so far as to injure the latter. Would such a wound have any effect on the wood; and, if so, what?

Zoology. (Mr. E. C. Cotes.)

1. How would you define the difference between an animal and a plant?

2. What is the use of breathing organs to an animal? Compare the breathing organs of the following animals:—Amœba, Silk-worm, Fresh water Crab, Fish, Tadpole, Frog, Horse.

3. Give an example of mimicry amongst animals, and explain how it is that one animal comes to mimic another.

4. In classifying the animal kingdom, into which groups would you put the following animals—musk-rat, squirrel, goat, bear, bat, pheasant, crow, turtle, bull-frog, shark, whale, cockroach, spider, snail, leech?

5. Are the following insects likely to be useful or the reverse in a Forest? Give reasons for your answers. Sand Wasps, Ichneumonidæ, Saw Flies, Ægeriidæ Moths, Lasiocampidæ Moths, Cockchafers, Buprestidæ, Ptinidæ, Bruchidæ, Longicornes, Tachinid Flies, Aphidæ.

Forest Law. (Mr. N. Hearle.)

1. Define ownership, joint-ownership, and co-ownership. Distinguish between rights and ownership. How may the former be extinguished?

2. How did Government become the proprietor of such vast areas of waste lands in India? Explain how settlements have modified the general right of Government in these lands.

3. What are the legal measures by which Government Forests are protected against fire?

4. Explain how summary trials are conducted, and why they are important as regards forest offences. Can all such offences be thus tried?

5. Explain the reason why forest rules are necessary in addition to the Acts. What are the chief subjects of these rules, by whom are they made, and under what legal authority?

6. Give the different legal powers conferred upon Forest Officers either by the Forest Acts or by Local orders made under those Acts.

7. Ram Gholam, headman of Piratpur village, during last rains secretly destroyed pillar No. 49 of the neighbouring reserved forest and rebuilt it 100 yards from its original position, hoping thus to include 10 acres of the reserve within his village land. What proceedings would you take against him?

8. How are criminal cases investigated by the Police?

Accounts and Procedure. (Babu Kasheshwar Mookerjee.)

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1. Give a definition of "Book keeping" and explain by an example the meaning of "Book keeping by single entry." Explain the terms "Balance," "Cheque," "Audit."

2. The Forest Department in the Jaunsár Division sells to the Commissariat Department, Chakráta, 10,000 cubic feet of Oak fuel at Rs. 25 per 100 cubic feet. The Commissariat Department supplies the Divisional Forest Officer with 20 iron drums at Rs. 4 each. State the procedure to be adopted in the adjustment of the transactions between the two Departments and give the entries you would make on the "Dr." and "Cr." sides of your Cash Book respectively.

3. Write out a Cash Book—Form No. 23—with the following entries, filling in sub-heads of charge and other information that may be required, also make Book Transfer entries, remittances to treasury, &c., where occasion arises;—

		Rs.	a.	p.
1st March 1892.	By paid salary of Protective Establishment for February 1892	512	0	0
" " "	By paid arrear salary of Rup Singh, Forest Guard, for December 1891	6	0	0
" " "	Cheque No. 51 of date on Dehra Dún Treasury	850	0	0
" " "	Income tax realized from A. B., Forest Ranger, on his pay for February 1892	1	4	0
" " "	Amount disallowed on T. A. bill of C. D., Forest Ranger, for November 1891 ...	1	5	4
10th " "	Received by transfer from the Mathematical Instrument Department, as per Bill No. 110, dated 5th March 1892, for a prismatic compass supplied	30	0	0
" " "	Mangal Singh, Contractor, for felling, sawing and carriage to Lalta Rau depôt of 10 scores of sál karis 12′ × 6″ × 4″ at Rs. 12-8 per score	125	0	0

		Rs.	a.	p.
12th March 1892	Received by the sale of the following timber from the Lalta Rau depôt :— 10 Sál karis 12′ × 6″ × 4″ at Rs. 20 per score. 1 Sál beam 12′ × 9″ × 6″ at Rs. 1-8 per cubic foot. 1 Miscellaneous log measuring 4 cubic feet at 8 annas per cubic foot.			
14th March, „	Cheque No. 52 on Dehra Dún Treasury of date	1,200	0	0
„ „ „	Repairs of the Lachiwála bungalow during December 1891	115	0	0
„ „ „	Constructing a temporary well at Ghamandpur Chauki, 20 coolies at 4 annas each ...	5	0	0
16th „ „	Compensation to the Zamíndár of Jhajra for a piece of land for a Forest Chauki ...	60	0	0
„ „ „	Weeding the bamboo plantation at Rámgarh, 5 coolies at 3 annas a day for 4 days ...	3	12	0
18th „ „	Clearing one mile and a half of compartment line in Mohamedpur block of the Balindawála forest used as an export road at Rs. 20 per mile	30	0	0
20th „ „	Cutting back 100 acres of sál coppice in Phandowála by contract	50	0	0
21st „ „	Account of the Forest Ranger, Rámgarh Range, for February 1892 (in 6 Vouchers)	212	8	0
25th „ „	Stationery supplied for the chaukis of the Ganges and Tirsal ranges	4	8	0
26th „ „	Temporary Establishment of Dâkmen during February 1892 for carrying Divisional dâks	18	0	0
27th „ „	Bill of Camelmen for carriage of Divisional tents and records during February 1892, 4 Camels at Rs. 8 per camel	32	0	0
30th „ „	Postage on a bearing parcel from the M. I. Department with prismatic compass ...	2	0	0

Then close the Cash Book, balancing it properly and neatly.

4. Prepare a salary list for the month of February 1892 of an establishment consisting of :—

1	Forest Ranger,	5th Grade,	at Rs. 60	per month.
1	„	6th „	„ 50	„
1	Forester,	1st Grade	„ 40	„
1	„	3rd „	„ 30	„
2	Foresters,	5th „	„ 20	„
2	Forest Guards,	1st Grade	„ 12	„
3	„	2nd „	„ 10	„
5	„	3rd „	„ 8	„
10	„	5th „	„ 6	„

The salaries of 1 Forester, 5th Grade, and 1 Forest Guard, 3rd Grade, were not disbursed during the month.

5. The following timber was received in the Parduni Forest depôt

1 Sál beam 18′ × 9″ × 8″
1 „ 15′ × 8″ × 6″
2 Scores of sál karis 12′ × 6″ × 4″
1 Score „ 10′ × 6″ × 4″
200 cubic feet of firewood

all of which except 100 cubic feet of firewood were then carried to the Lalta Rau depôt and there sold, the sál beams at Re. 1-8 per cubic foot, the karis at Rs. 20 per score, and the firewood at Rs. 10 per 100 cubic feet. Fill up the necessary timber returns.

6. Describe briefly the procedure to be observed on receipt and despatch of correspondence in an Office provided with Clerks and in one in which there is no Clerk provided.

Lower Class.

Forestry.

1. Compare pure and mixed forests, and explain the advantages of the latter.

2. How do you account for the gregariousness of sissu?

3. Describe the best method of testing seeds.

4. Describe the method of stacking and export of fuel adopted in Changa Manga.

5. How is deodár sown and planted in Jaunsár?

6. Describe briefly the improvement fellings in the sál forests of the Dún.

7. Describe the resin-tapping operations at Kathian, and mention the economic uses of resin.

8. Describe briefly the system of working the bamboo forests of the Saháranpur Division.

Forest Engineering.

1. What are the characteristics of first class bricks?

2. Describe the different kinds of tiles, stating their use.

3. What is mortar, and what precautions should be taken in its use?

4. What is concrete, and how is it laid?

5. What is bond, and why is it necessary? Give plans and elevation of a brick wall 3 bricks thick and 5 courses high.

6. How would you make a terrace floor?

7. What considerations should guide you in making a cart road for forest purposes?

8. Describe the Dakhpathar boom.

Mathematics.

1. Simplify (*a*) $\left\{1+\frac{5}{9}+\frac{7}{8}+\frac{11}{12}\right\}\div\left\{\frac{3}{4}-\frac{5}{8}\right\}$
(*b*) $(2{\cdot}37979+4{\cdot}22)\div(3{\cdot}041-{\cdot}93)$.

2. If a man can perform a journey of 170 miles in $4\frac{1}{4}$ days of 11 hours each, in how many days of $8\frac{3}{4}$ hours will he perform a journey of 470 miles?

3. What sum of money will produce £43 interest in $3\frac{1}{4}$ years, at $2\frac{1}{4}$ per cent. simple interest?

4. Simplify $4a-\left\{(4a-2x)-[3a-(2x-2a)]+x\right\}$
Subtract $4a-\left\{x-(26-y)\right\}$ from $4a-x-26-y$.

5. Multiply $1-x+x^2-x^3$ by $1+x+x^2+x^3$; and divide $28x^4+13x^2y^2-xy^3+15y^4$ by $4x^2+4xy+3y^2$.

6. The chord of an arc is 16 inches, and the chord of half the arc is 10 inches; find the diameter of the circle.

7. The sides of a triangular field are 350, 440, and 750 yards; the field is let for £26 5*s*. a year: find at what price per acre the field is let.

8. A vessel is in the form of a cube; it is without a lid: if the external length is 3 feet, and the thickness of the material 1 inch, find the number of cubic inches of the material.

Surveying.

1. Describe the two kinds of measuring chains commonly used, and state the class of work for which you would select each of them.

2. The distance between two points was 14,400 feet measured with a 100 feet chain which was correct before the measurement commenced but was found to have stretched one inch after the measurement. What was the true distance between the points?

3. How would you chain up and down a sloping ground?

4. Give a list of the things and the number of men you would require for the following kinds of survey, carefully explaining the duties of each man:—

(*a*) Survey with the chain only.
(*b*) " " " Prismatic compass and the chain.
(*c*) " " " Plane-table and the chain.

5. From B to A the bearing is 301° 30′ and the distance $2\frac{1}{2}$ chains. From B to C the bearing is 54° 30′ and the distance 2

chains. Find the bearing and distance of C from A, and also the interior angles of the triangle ABC.

6. In what points does a plane-table survey differ from a compass survey?

7. What is meant by levelling? Draw up an imaginary levelling field-book with two pairs of back and foresights, and not less than 3 intermediate sights between each pair. The book should be worked up ready for plotting.

8. Two points which are 5¼ inches apart on the map, are 7,260 feet apart on the ground. What was the scale of the map?

Chemistry, Physics, and Physical Geography.

1. Define acids, alkalis, and salts.

2. If oxygen, hydrogen, and nitrogen are given you in three different bottles, how would you ascertain which was which? State the method of preparation, and how they occur in nature.

3. State the properties of solids, liquids, and gases.

4. Explain endosmose and exosmose.

5. Explain how the following are formed:—rain, clouds, dew, snow; and what is the cause of the sea breeze?

6. How are the rocks which cover the surface of the earth disintegrated?

Geology and Soils.

1. What are sedimentary rocks? Give their origin, varieties, and composition.

2. What are fossils, and how are they formed? What is their use in Geology?

3. How are soils formed in nature?

4. What are the chief Physical and Chemical properties which distinguish clay and sandy soils?

5. What elements of soils are necessary for plant life, and how are they absorbed?

6. Describe the chief soils you have seen in the Dún.

Botany (Anatomy and Physiology).

1. Explain the structure and growth of cells and the formation of new cells.

2. What are tissues and how are they formed? Give the different kinds.

3. What is the difference between assimilation and metastasis?

4. How does longitudinal growth take place in roots, stems, and leaves?

5. Explain the relations of plant life to temperature and light.

6. How does a wound heal up? If the cut extends to the wood, give a diagram.

Botany (Morphology and Classification).

1. Show, by rough sketches, the following forms of leaves: pinnate, entire, emarginate, cordate. Attach to each of the leaves given you a label giving its description.

2. Define complete and incomplete, regular and irregular flowers; and mention the different parts of a flower with their respective functions.

3. Define fruit and seed, and mention different kinds of fruits, with examples.

4. What are the characters which distinguish monocotyledonous and dicotyledonous plants? To which does the sample given you belong and why?

5. What are gymnospermous plants?

6. Give a short account of the chief species of Forest trees that you observed on and around the Deoban Hill in Jaunsár. (What are the chief families represented?)

Forest Law.

1. What is possession and what are its consequences? What is adverse possession?

2. How has Government come to possess all the waste lands in India?

3. What are the objects of a special forest law?

4. How does a reserved forest differ from a protected forest?

5. What are the principal features of the Cattle Trespass Act, and what special provisions are made in the Indian Forest Act against cattle trespass in any portion of a closed Government forest?

6. Some quantity of unmarked timber is caught every year at the Dakhpathar boom. How is such timber disposed of?

7. How were the Dún forests constituted into Government reserved forests?

8. What penalties does the Indian Forest Act provide for the following offences :—

(*a*) Girdling a tree in a reserved forest;

(*b*) Collecting horns in a protected forest;

(*c*) Making a mark on a tree similar to one which indicates that it is to be felled.

Are all the above offences compoundable?

Accounts and Procedure.

1. Define a Cash Book and Ledger.

2. Name the authority whose sanction is required for the following works :—

(*a*) Clearing and repairs of an export road costing Rs. 250 ;

(*b*) Cutting a fire line two miles at Rs. 40 per mile, and burning the same at Rs. 10 per mile ;

(*c*) Purchase of a chair for a range office at Rs. 3-8-0 ;

(*d*) Rent of a piece of land occupied for a forest-chauki for 1891-92, Rs. 2 ;

(*e*) Expenses of witnesses attending divisional forest office in a forest case, Re. 1.

3. In cutting creepers and weeding the Rámgarh plantation from 1st to 15th February 1892 the following labourers were employed :—

1 Tindal,	10 days,	at 4 annas				per day.
1 „	2 „	„ 3 „	6 pies			„
4 beldárs	4 „	„ 3 „				„
10 „	8 „	„ 2 „				„
10 boys		„ 2 „				„

Prepare a daily labour bill for the same.

4. Write out a Cash Book (Form No. 23) with the following items, filling up sub-heads of receipts and charges, remitting revenue to Treasury where required and closing the book correctly and neatly. The Cash Book should be of A. B. Forest Ranger, Rámgarh range, Dehra Dún Division, for February 1892 :—

		Rs.	a.	p.
3rd.	Advance from Divisional Forest Officer, Dehra Dún, for current expenses	450	0	0
„	Felling 200 sál trees in the Muhammadpur block and converting them into ballis at 4 annas cash	50	0	0
„	Carriage of the same to Muhammadpur Forest depôt at 6 pies each	6	4	0
6th.	Muhammad Bakhsh for cutting in Rámgarh block and carriage to Muhammadpur Forest depôt of 480 cubic feet of fuel at Re. 1-8-0 per 100 cubic feet	6	12	0

	Rs.	a.	p.
6th. Temporary establishment of Forest guards for watching export of fuel by lime-burners during January 1892	6	0	0
8th. Purchase of 20 axes for departmental timber operations at Re. 1 each	20	0	0
9th. Clearing 1 mile and repairing 2 bridges on the Mothronwála-Rámgarh road by contract	15	0	0
10th. Salary of Subordinate Forest Establishment of the range for January 1892	100	0	0
14th. Sale of 100 sál ballis from the Muhammadpur Forest depôt at Re. 1 each	100	0	0
15th. Remittance to the Dehra Dún Treasury as per chalán No. 10, dated 14th February 1892	100	0	0
16th. Digging a temporary well, 14 coolies at 4 annas each ...	3	8	0
18th. Clearing 1 mile of the boundary line of the Bulludawála Forest by contract	15	0	0
19th. Climber cutting in the Assarori forest, 20 coolies at 4 annas per coolie	5	0	0
25th. Grazing dues on 20 bullocks at 4 annas each	5	0	0
„ 20 head loads of fodder grass removed from the Rámgarh forest at 1 anna each	1	4	0
„ 20 sál tors removed by Rup Rám from the Assarori forest at Rs. 15 per score	15	0	0
„ Sale of a drift sissu log in the Susera	4	0	0
28th. Compensation to the Mahant of Dehra for land taken up for Mothunwála Chauki	20	0	0
„ Expenses of 4 witnesses attending Divisional office at 4 annas each	1	0	0
„ Sale of 20 rejected axes by auction	2	8	0
29th. Cutting back 1,200 acres of coupe No. 3 Muhammad block, sold in 1885-86	100	0	0
30th. Creeper cutting in coupe No. 5 of Muhammadpur block 750 acres	60	0	0

5. Ram Bakhsh, Contractor, was paid for the felling of 100 sál trees in the Phandowála block, converting them into 2½ scores of karis, 10 beams, 5 tors and 200 cubic feet of firewood, and carrying the wood to Muhammadpur Forest depôt, whence the following were sold during February 1892 :—

1½ scores of sál karis at Rs. 10 per score.
5 beams at Rs. 4 each.
5 tors at Re. 1 each.
200 cubic feet firewood at Rs. 10 per 100 cubic feet.

Prepare the necessary timber registers and returns in the Forms 5, 6, 7, 8 supplied you.